

Issued with Army Orders for October, 1920.

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September, 1920.

(War pamph.
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CARRIAGES, MARKS VII and VIIa.

ISSUED BY THE GENERAL STAFF.

September, 1920.



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GENERAL INSTRUCTIONS.

Practical instruction in the equipment should be given to each recruit before any attempt is made to instruct him in gun drill. This instruction should take the form of demonstrations dealing with the work of each number in the detachment; and all men under instruction should, in turn, carry out the work of each particular number.

Instruction in gun drill should begin as soon as they are conversant with all parts of the equipment, and can handle in the best and quickest manner each of the working parts of the gun. Once the work of each number has been thoroughly mastered, it should not take long for the recruit to learn the actual drill.

It is most important that a marked distinction should be drawn between instruction and drill.

During the former the language used should be as simple as possible, and the meaning of all technical terms which are necessary must be carefully explained. A conversational tone should be adopted and under no circumstances whatever should anything in the nature of long quotations from drill books be allowed. The men should be permitted to assume an easy attitude and their interest should not be allowed to flag. They should be encouraged to ask questions.

At drill, on the contrary, rigid discipline must be maintained, orders must be clear and decisive and the detachments made to work steadily, smartly and rapidly. At the same time the utmost accuracy is essential and any deviations from the methods laid down must at once be checked.

CHAPTER I.—GENERAL DUTIES.

This chapter summarizes the duties of each individual number in the detachment. It is only intended as a guide to the instructor, who should use his own words in explaining the various duties to the men.

The detachment is composed of eleven numbers. The service of the gun is divided between them as follows :—

1	...	...	...	...	...	in command.
2	...	...	...	...	...	the breech.
1 and 3	...	...	...	...	...	the sights.
2, 4, 5 and 7	...	...	...	...	...	the trail.
6 and 11	...	...	...	...	...	the cartridges.
7, 8, 9 and 10	...	...	...	...	...	the shell.

The duties of each individual number are as follows :—

No. 1.

1. He COMMANDS and is responsible for the entire service of his gun.

2. He gives the WORDS OF COMMAND detailed for him in chapter II, and repeats all ORDERS affecting his detachment which have not been heard by the numbers concerned. His orders must be given clearly, but no louder than is necessary to enable his detachment to hear.

He assists in passing orders down the battery when necessary.

He acknowledges orders by saluting. He must salute correctly, and face so that his salute can be clearly seen.

(B.15111)

A 2

3. He is responsible :—

- (i) That the BUFFER is properly filled, that there is no leakage at the stuffing box, that the buffer is firmly nutted up to the lug of the gun, and the piston rod to the front cradle cap.
- (ii) That the RECUPERATOR is correctly charged with liquid and air, that there is no leaking at the stuffing boxes or rear end of the liquid cylinders, and that the rams are nutted up to the front cradle cap.
- (iii) That the ACTUATING GEAR of the piston rod is properly assembled.
- (iv) That the SIGHTS are tested. This is done under the supervision of the section commander.
- (v) That the wooden STOP for the quick elevating gear is in its place, except when elevations below the loading position ($7\frac{1}{2}$ degrees on level ground) are required, either for testing equipment or for firing at short ranges. In the latter case the lever of the quick elevating gear must be jammed with a piece of wood to prevent the loading plunger engaging.

4. At preparation for action he places the WATKIN CLINOMETER over his right shoulder, and procures the buffer and recuperator SPANNERS and a piece of CHALK.

5. On coming into action he procures the ADAPTER and PRESSURE GAUGE.

6. The GUN PLATFORM must be firm and level, and a "fishtail" must be constructed for the shoe under the trail to run on during recoil. This must be large enough to cover

all switches. If the platform is not level he manipulates the recoil scotches so as to prevent side-slip.

7. As soon as the gun is in action he ascertains the lowest elevation at which the trajectory will CLEAR THE CREST. He reports this elevation to the section commander.

8. He selects the auxiliary aiming point and records in chalk on the chase the ZERO LINE angles from the auxiliary aiming point and battery picket.

9. Before the gun is laid on a NEW TARGET he gauges the line of fire, and directs the gun into the line, ordering 2, 4, 5 and 7 to move the trail. One foot at the trail-eye corresponds to 4 degrees of traverse; on the Vickers platform the holes in the rear beam are 4 degrees apart.

10. (i) At INDIRECT LAYING with SIGHT CLINOMETER, he lays for elevation. He sets on the sight clinometer the angle of sight and position correction ordered. He orders the gun deflection (if any) and sets on the sight clinometer the gun correction for the elevation ordered. He lays by bringing the bubble of the sight clinometer to the centre of its run.

(ii) At INDIRECT LAYING with WATKIN CLINOMETER, he applies the index correction (if any) of his clinometer to the elevation ordered, sets the clinometer and directs 3 to elevate and depress until the bubble of the Watkin clinometer is in the centre of its run.

(iii) At DIRECT LAYING he levels the sight clinometer by means of the micrometer head as soon as 3 has laid the gun.

11. (i) When SETTING the SIGHT CLINOMETER he turns the top of the micrometer head towards himself last, to take up backlash.
- (ii) When SETTING the ELEVATION INDICATOR he turns the top of the elevation indicator handwheel towards himself last.
- (iii) When using the WATKIN CLINOMETER he sees that the clinometer plane and the base of the clinometer are free from grit or dirt, and that the clinometer is placed exactly in the same position on the plane for each lay.
- (iv) When LAYING he depresses last (top of the handwheel towards himself) with at least two complete turns of the handwheel. If the bubble of the clinometer over-runs the centre he rapidly gives the elevating wheel two complete turns of elevation, followed by $1\frac{1}{2}$ turns of depression before completing the lay.

12. He supervises the preparation and supply of AMMUNITION. As time fuzees deteriorate rapidly when unprotected from damp, only such as are required for immediate use will be uncovered. When one group of ammunition is nearly expended, he reports particulars of the next group to be used.

13. He supervises LOADING.

The shell should be rammed home vigorously with a good travel. The sound of the driving band engaging the rifling should be distinctly heard. Irregularity in ramming causes irregular shooting, especially when the gun is worn. An improperly rammed shell may slip back when the gun is elevated and cause a premature.

He sees that the correct charge is loaded.

14. He gives the order to FIRE. The gun will on no account be fired without his order. Before giving this order he sees that the red lines on the breech and breech screw coincide, showing that the breech is properly closed, that the firing plunger of the quick elevating gear is properly engaged, and that the gun is in all respects ready.

15. He is responsible that the INTERVAL between rounds is properly kept as regards his own gun. When a salvo or quick rate of battery fire (less than 5 seconds interval) is ordered, he extends his right arm above his head as soon as his gun is ready to fire.

16. At intervals he checks the LENGTH OF RECOIL. He compares the elevation given by the recoil indicator with the elevation on the brass elevation arc situated below the sight.

17. He watches the movement of the CARRIAGE on recoil and adjusts the recoil scotches as required.

The position of the scotches depends on the individual platform, but the following distances, measured from the point where the wheel touches the ground to the front edge of the scotch, may be taken as a guide for placing the rear scotches:—

Sixth charge, 6 feet; fifth charge, 5 feet, and so on.

In wet weather grit should be placed under the scotches to prevent them slipping.

18. As soon as his gun has fired he gives the order to LOAD if the battery commander's orders indicate that this is his intention.

19. When RAPID or PROLONGED FIRING takes place he takes every opportunity of attending to his equipment. The chamber, mushroom head and breech block should constantly be sponged with water. If the gun is hot the bore

should be cooled with water when "Stand easy" is ordered.

No. 2.

1. He works the QUICK ELEVATING GEAR and BREECH MECHANISM and FIRES the gun. He is responsible for the right BRAKE and the breech and muzzle COVERS. With 5 he tests and adjusts the OBTURATING PAD. He assists 4, 5 and 7 to LIFT and TRAVERSE the trail and to RAM.

2. At preparation for action:—

- (i) He straps the TUBE POCKET round his waist and fills it with tubes.
- (ii) He places the LANYARD round his neck and tucks the ends into his belt.
- (iii) He sees that the VENT BIT, RIMER and OIL CAN are in the pockets on the right trail-arm.
- (iv) He procures the breech mechanism WRENCHES.

3. On coming into action he places his iron-shod LEVER on the right of the carriage, one yard clear and head in line with the front of the wheel.

- 4. (i) To bring the gun to the LOADING POSITION ($7\frac{1}{2}$ degrees elevation) he releases the quick elevating gear by lifting the lever, places both hands on the cradle slide and allows the breech to come up gently until the loading plunger is engaged.
- (ii) To bring the gun to the FIRING POSITION he releases the quick elevating gear by bearing down on the lever, grasps the cradle slide with both

hands and lowers the breech gently until the firing plunger is engaged.

5. (i) To OPEN the BREECH:—He takes hold of the lever breech mechanism with the left hand, thumb uppermost, and slides the hand down so as to press down the catch retaining, at the same time pulling the lever to the rear and then swinging it round to the right as far as it will go.
- (ii) To CLOSE the BREECH:—The above procedure is reversed. The breech must on no account be slammed.

6. He puts on the right BRAKE as soon as the gun is laid in the line of fire.

7. He assists 4, 5 and 7 to RAM. The shell is rammed home as follows:—

As soon as the loading tray is in position, 4 and 7 quit the front handles, and with 2 and 5 step on to the trail, 2 and 4 on the right, 5 and 7 on the left, 2 and 5 nearer the breech.

5 places the head of the rammer against the base of the shell, and at the order "Half way" the four numbers push the shell forward until the base is 6 inches inside the face of the breech.

They then reach out and grasp the rammer as far to the rear as convenient, inner hands back up, and outer hands back down, facing the rear. 1 orders "Home" and the shell is rammed home with full force.

8. At the order "READY," he passes the loop of the firing wedge over the striker cap and pulls it towards him until the cap passes the projections on the wedge. He steps clear of the wheel and stands facing the front. He holds the toggle in his right hand and grasps the centre of the lanyard with his left hand.

9. At the order "FIRE" he jerks the lanyard smartly. The gun will on no account be fired without the order from 1.

10. He oils and cleans the BREECH MECHANISM when necessary during firing.

No. 3.

1. He LAYS and is responsible for the SIGHT COVER. He directs 6 when planting AIMING POSTS. He assists 1 to test the SIGHTS.

2. At preparation for action he procures a piece of CHALK.

3. On coming into action he places the No. 7 DIAL SIGHT and carrier and the SIGHT CLINOMETER in their brackets.

4. (i) He always LAYS for LINE. He sets on the dial sight the aiming point angle and all deflections ordered, and CROSS LEVELS the sight. He lays on the left edge of the aiming point unless otherwise ordered.

(ii) At INDIRECT LAYING with WATKIN CLINOMETER he sets the elevation indicator at the elevation ordered and elevates and depresses under the orders of 1.

(iii) At DIRECT LAYING he lays both for line and for elevation over the open sights.

5. (i) When setting the dial sight by means of the QUICK RELEASE he moves the micrometer head through one complete turn to ensure that the teeth have re-engaged correctly.

(ii) When SETTING a right deflection on the dial sight he turns the right micrometer head away from him

with his right hand ; when setting a left deflection he turns the left micrometer head towards himself with his left hand.

- (iii) When READING a left angle on the dial plate he reads the minutes off the left micrometer scale ; when reading a right angle he reads the minutes off the right micrometer scale.
- (iv) When LAYING for LINE he turns the top of the traversing handwheel towards himself last.

6. For the first round, the pointer of the TRAVERSING GEAR must be within 30 minutes of zero when the lay is completed, except when engaging G.F. or similar targets.

7. CROSSHEADS are fitted to aiming posts to compensate for lateral movement of the sight. Both crossheads have similar markings and numbers. He notes which corresponding pair of markings are in line and uses them to lay on. He directs 6 to clamp the crossheads low down, so that the bottom of the far one is just visible over the top of the near one.

8. He records in chalk on the breech the PRESENT TARGET angle from the auxiliary aiming point, battery picket, or aiming posts.

9. The following are the signals used by 3 :—

SIGNAL.

MEANING.

- (i) When directing 2, 4, 5 and 7 to move the trail :—

Palm of the hand in the required direction.	Trail right (or left).
Fist clenched 	Stop traversing.
Smart tap on the thigh with the palm of the hand.	Take post.

SIGNAL.	MEANING.
(ii) When directing 6 to plant aiming posts :—	
Right arm extended to the right or left arm extended to the left.	Move in the direction indicated.
Arm dropped	Halt.
Both arms dropped sharply from above the head.	Plant.
Upward or downward motion of the arms with both arms extended laterally.	Raise or lower the crosshead.
Both arms extended above the head and moved laterally in the required direction.	Move head of post in the direction indicated.
Both arms extended sharply upwards.	Pick up.
Both arms extended to the front.	Move to plant the far aiming post.
Body turned about and both arms extended to the rear.	Come in.

No. 4.

1. He prepares SHELL and with 7, 8 and 9 carries them to the gun. He assists 2, 5 and 7 to LIFT and TRAVERSE the trail and to RAM.
2. At preparation for action he procures a McMahon SPANNER.
3. On coming into action he places :—
 - (i) His iron-shod LEVER in rear of the trail, head to the front and two yards clear of the trail-eye.
 - (ii) The LOADING TRAY with the shell.

No. 5.

1. He is responsible for the left BRAKE. He assists 2, 4 and 7 to LIFT and TRAVERSE the trail and to RAM.

2. He is responsible for the BREECH and CHAMBER, and assists 2 to test and adjust the OBTURATING PAD.

3. At preparation for action he puts a FUZE KEY in his pocket, placing the lanyard round his neck.

4. On coming into action he places :—

(i) His iron-shod LEVER on the left of the carriage, one yard clear and head in line with the front of the wheel.

(ii) The RAMMER on the left of the trail, head in line with the centre of the trail and about one yard clear.

(iii) TALLOW and WASTE on the left of the carriage.

5. He puts on the left BRAKE as soon as the gun is laid in the line of fire.

6. He UNCAPS FUZES. On removing the cap of a No. 106 fuze he sees that the tape is correctly wound and that the ends of the shearing wire are visible.

7. He picks up the RAMMER with his right hand and passes the head under his right arm. As soon as the loading tray is in position he steps on the trail and places the head of the rammer against the base of the shell. (At drill he places it against the face of the breech.) He replaces the rammer in the same way.

No. 6.

1. He provides DRAGROPES and does any DIGGING required in the service of the gun. He plants AIMING POSTS and LOADS CARTRIDGES.

2. On coming into action he places :—

- (i) PICK and SHOVEL on the right of the carriage and 3 yards clear.
- (ii) DRAGROPE, folded, in rear of the pick and shovel.
- (iii) AIMING POSTS, with crossheads clamped, outside 2's iron-shod lever, heads to the front.

3. He assists 11 to prepare CARTRIDGES, carries them to the gun and loads them from the left side. He holds the cartridge with the charge number upwards for 1 to check, but in wet weather he must keep the igniter dry. He places the cartridge in the chamber so that the igniter faces the vent and is just clear of the mushroom head. If the cartridge is thrown to the front of the chamber, either by 6 or by the closing of the breech screw, a missfire may occur.

No. 7.

1. He prepares SHELL and with 4, 8 and 9 carries them to the gun. He assists 2, 4 and 5 to LIFT and TRAVERSE the trail and to RAM.

2. On coming into action he places his iron-shod LEVER in rear of the trail, head to the front and two yards clear of the trail eye.

No. 8.

1. He prepares SHELL and with 4, 7 and 9 carries them to the gun.

2. At preparation for action he puts a FUZE KEY into his pocket and places the lanyard round his neck.

3. After loading he assists 9 to remove the LOADING TRAY.

No. 9.

1. He provides DRAGROPES and does any DIGGING required in the service of the gun. He prepares SHELL and with 4, 7 and 8 carries them to the gun.
2. On coming into action he places :—
 - (i) PICK and SHOVEL on the left of the carriage and 3 yards clear.
 - (ii) DRAGROPE, folded, in rear of the pick and shovel.
3. After loading he assists 8 to remove the LOADING TRAY.

No. 10.

1. He is responsible for the preparation and supply of TUBES and SHELL.
2. At preparation for action :—
 - (i) He puts a FUZE KEY into his pocket and places the lanyard round his neck.
 - (ii) He procures a BRUSH, HAMMER and FILE.
3. He sees that shell are :—
 - (i) Scrupulously CLEAN, especially the driving bands. Brushes and water should be used if necessary.
 - (ii) SORTED into groups by nature, driving band and weight.
 - (iii) STORED standing up on clean planks.
 - (iv) FUZED as ordered and protected from damp.
 - (v) ISSUED from the group ordered.
4. When using No. 106 fuzes :—
 - (i) He BREAKS the wire and seal on issuing the round.

- (ii) He DISCARDS any fuze of which the wire and seal are already broken, or the cap deficient, and sees that on no account is it replaced in wagon or lorry.

5. When one group of shell is nearly expended, he REPORTS to 1 the particulars of the next group.

No. 11 OR COVERER.

1. He is SECOND IN COMMAND of the detachment and is responsible for the preparation and supply of CARTRIDGES.

2. At preparation for action he procures a SCREW DRIVER.

3. He sees that cartridges are :—

- (i) SORTED by nature of propellant and "group" number.
- (ii) STORED in boxes and protected from extremes of temperature and from damp.
- (iii) PREPARED correctly ; all sections bearing a higher number than the charge ordered are removed.
- (iv) ISSUED from the group ordered.

4. When one group of cartridges is nearly expended, he REPORTS to 1 the particulars of the next group.

CHAPTER II.—GUN DRILL.

Artillery Training lays down the principles of battery tactics, which vary little with different equipments. This chapter details the orders given and the procedure by which these orders are carried out in batteries armed with the 8-inch B.L. Howitzer.

The wording must be memorized and strictly adhered to, with the exception of sections 31 and 32.

The executive order is shown throughout as being given by the section commander, as will normally be the case during training. When orders can be heard throughout the battery they will be acted upon without repetition. Instructors will invariably employ the orders detailed for the section commander, even when drilling a single detachment.

1. POSITIONS AT DETACHMENT REAR.

The detachment falls in two deep, one pace between ranks, 1 on the right and 11 on the left of the front rank. 1 is not covered.

When the gun is limbered up, the front rank is three paces in rear of the muzzle, 1 covering the off gun wheel.

When the gun is in action, the front rank is one pace in rear of the trail eye, 1 covering the right gun wheel.

2. TO TELL OFF.

Section commander.

"...section—Tell off."

1 numbers himself 1, the right-hand man of the rear rank 2, his front rank man 3 and so on.

3. TO CHANGE ROUND.

Section commander.

"...section—*Change round.*"

1 takes a pace to the rear with his right foot and a pace to the left with his left. The left hand man of the rear rank takes a pace to the front. At the same time the remainder of the front rank take a pace to the right and the rear rank a pace to the left.

(The detachment is then again told off.)

4. TO MOVE THE GUN WITH DRAGROPES WHEN LIMBERED UP.

Section commander.

"No....—*With dragropes, prepare to advance.*"

"No....—*Double man No....*"

6 and 9 of the named gun band the dragropes to 2 and 5; 2 and 5 hook them to the dragwashers on their own sides, the backs of the hooks downwards; 8, 9, 10 and 11 go to the drawbar of the limber; the remainder man the ropes, even numbers on the near side, odd numbers on the off.

The detachment of the other gun of the section double to the named gun and man the ropes.

At the order "Walk march" the carriage is moved to the front.

At the order "Halt" the carriage is halted and the detachments remain at their posts.

At the order "Detachments rear," 2 and 5 of the named gun unhook the dragropes, 6 and 9 replace them; both detachments double to their places and halt.

5. TO PREPARE FOR ACTION.

Preparation for action will be carried out before leaving the gun park or moving into action. When in action advantage should be taken of any interval to examine, test and arrange equipment.

Section commander.

"...section—Prepare for action."

Each number procures the small stores detailed in chapter I, and checks the other stores for which he is responsible. **1** then orders "Unlimber."

1 tests the clinometer and the elevation indicator, sees that the bore is clear, the buffer full and the air pressure correct, and satisfies himself that the detachment and equipment are in all respects ready for action.

2 removes the breech and muzzle covers, examines the breech mechanism and tests the quick elevating gear. He replaces the breech and muzzle covers if ordered.

3 removes the sight cover and examines and tests the sights with the assistance of **1**. He then examines the elevating and traversing gears. He replaces the sight cover if ordered.

4 and **5** remove the cradle clamp.

5 examines the chamber and threads of the breech.

The remaining numbers examine and prepare ammunition if ordered.

As soon as preparation for action is completed, **1** collects reports and orders "Limber up." The detachment form detachment rear and **1** reports to his section commander "No ..., ready for action" or otherwise.

(B 15111)

A 4

6. TO LAY THE VICKERS PLATFORM.

The platform is laid by two detachments under the supervision of the section commander.

The platform is brought up on its transporting carrier and halted in rear of the position.

The following stores are brought up:—

Director	1	Picks	6
Tape, 100 ft.	1	Shovels	6
Field level	1	Spades	6
Aiming posts	3	Rammers, earth ...	4
Dragropes, heavy, pairs	1	Maul	1
Tarpaulin	1	Hammer	1
Mineral jelly, waste and tracing tape.		Spanner No. 289, Mark II	1

The tarpaulin is laid out clear of the position and the stores are arranged on it.

The section commander lays out the centre line of the platform and traces the trenches.

The trenches are dug to the required depth and levelled in all directions; they should be kept as closely as possible to the dimensions traced and in particular the rear face of the rear trench should be clean cut.

The wheel platform and bearers are removed from the transporting carrier and the beams lowered to the ground.

The lower clamp bar and bolts are put into position and the lower rear beam is lowered into its trench by means of the bearers.

The side beams are lowered into their trenches by means of the bearers, their rear ends fitting into the recesses in the rear beam. The front ends are connected by the hinge pin which is passed through the eye on the steel hawser.

DIAGRAM.

Technical drawing of a roof truss structure. The drawing shows a cross-section of a roof with a central vertical axis. The roof is supported by a base structure. Key dimensions and angles are labeled:

- Top width: $8'8''$
- Top width (inner): $2'2''$
- Height from top to middle: $2'9''$
- Height from middle to base: $6'8''$
- Base width: $18'10''$
- Base height: $3'6''$
- Base width (inner): $5'4''$
- Angle at top: 72°
- Angle at middle: 74°
- Angle at base: 10°
- Angle at base: 15°
- Angle at base: 21°
- Angle at base: 6°
- Angle at base: $1'8''$
- Angle at base: $1'10''$
- Angle at base: $2'6''$

The beams are now tested for level and adjusted if necessary.

The upper rear beam is placed in position with its recesses fitting the rear steel angles of the side beams. The upper clamp bars are fixed and the bolts nutted up. The locking bars are secured.

The steel hawser is connected to the lower rear beam and nutted up.

The wheel platform is placed in position with its angle plates inside the side beams and its front face butting against the front angle plates of the side beams.

The earth is rammed well round the beams flush with their tops.

7. TO COME INTO ACTION.

Action rear.

Section commander.

"...section—Action rear."

1 places himself so that he can see when his gun is in the required position. He then orders "Halt—Action rear."

All the numbers except 1, 10 and 11 go to the trail, even numbers on the near side, odd numbers on the off, highest numbers nearest the trail eye; 9 unkeys.

1 orders "Lift" and the trail is lifted and slewed clear of the hook. "Lower" and the trail is lowered to the ground.

1 orders "Limber, drive on"; the limber advances five yards, halts for stores to be removed and proceeds to the wagon line under the direction of the battery serjeant-major.

(B 15111)

A 5

6 and 9 hand the dragropes to 2 and 5; 2 and 5 make fast wheel purchases; all numbers except 1 man the ropes, even numbers on the right, odd numbers on the left.

At the order from 1 the gun is hauled on to the platform. (With the Vickers platform the thrust bracket on the sole plate of the trail is fitted into its recess on the upper rear beam.)

As soon as the gun is in position, 6 and 9 replace the dragropes. 4 and 5 remove the keys securing cradle clamp; 2 brings the gun to the loading position; 4 removes the cradle clamp and places it clear.

The stores are placed in position by the numbers responsible for them.

The numbers take up their positions in action.

Action right, Action left, Action front.

As soon as the trail has been lowered to the ground 6 makes fast a dragrope to the trail eye and the trail is moved in the required direction.

8. POSITIONS IN ACTION.

1 where he can best superintend the work of the detachment.

2 on the right of the gun, close to the breech, facing the front.

3 on the left of the gun, in rear of the dial sight, facing the front.

5 on the left of the gun, in line with the centre of the trail, one yard clear and facing the trail.

6 and 11 with the cartridges.

4, 7, 8, 9 and 10 with the shell.

9. TO FORM DETACHMENT REAR IN ACTION.

Section commander.

"...section—*Detachment rear.*"

1 doubles to his place (one yard in rear of the trail eye and covering the right gun wheel) and gives the order "No..., double march."

At the order from 1 the remainder double to their places and halt.

10. TO TAKE POST FROM DETACHMENT REAR.

Section commander.

"...section—*Take post.*"

The detachment double to their places by the shortest way and halt.

11. TO OBTAIN THE LINE OF FIRE.

The line of fire is obtained by one of the methods described in Artillery Training.

12. TO LAY THE GUN IN THE LINE OF FIRE.

Section commander.

"...section—*Aiming point..., ...degs....mins. right (or left).*"

1 orders "Take post to lay"; 2 closes the breech and brings the gun to the firing position; 2, 4, 5 and 7 pick up the iron-shod levers and fit them into the brackets on the trail.

1 sets the elevation indicator at 20 degrees and the sight clinometer at zero, and brings the bubble to the centre of its run by the elevating handwheel.

3 sets the dial sight and lays roughly on the aiming point, directing **2, 4, 5** and **7** to move the trail.

3 gives the signal "Take post." **2, 4, 5** and **7** replace their iron-shod levers. **2** and **5** put on the brakes. (With the Vickers platform **1** must first insert the spade pin in the nearest hole.)

3 brings the cross level bubble approximately to the centre of its run and lays accurately for line with the traversing gear.

3 reports to **1** the readings of the dial sight from the battery picket and auxiliary aiming point; **1** records them on the chase.

2 brings the gun to the loading position and opens the breech.

The section commander goes to his guns and takes a note of the angles recorded.

If necessary, **1** orders "With dragrope, trail right (or left)." **6** (or **9**) hooks a dragrope to the trail eye; all numbers except **1** and **3** man the rope and heave as directed by **1**.

At the order "Take post to lay," **2, 4, 5** and **7** man the levers, **6** (or **9**) replaces the dragrope and the remainder resume their posts.

13. TO ASCERTAIN THE LOWEST ELEVATION AT WHICH THE TRAJECTORY WILL CLEAR THE CREST.

When the crest is within 100 yards of the gun.

The angle of sight to the crest is the elevation required.

1 lays the gun just clear of the crest by looking along the bottom of the bore and ordering **3** to elevate or depress as

required. He then sets the sight clinometer at zero, brings the bubble to the centre of its run by turning the elevation indicator handwheel, and reports the reading of the elevation indicator to the section commander.

When the crest is over 100 yards from the gun.

The procedure is the same but an allowance is made for the elevation due to the range to the crest.

1 proceeds as before. The section commander makes a liberal estimate of the range to the crest and adds the elevation for this range (with first charge unless otherwise ordered) to the elevation reported by **1**.

14. TO PLANT AIMING POSTS.

Section commander.

"...section—Aiming posts front (or rear)."

2 closes the breech and brings the gun to the firing position.

6 doubles to the front (or rear) of his gun with two aiming posts and plants them as directed by **3** in line with the dial sight set at zero (or 180 degrees). He plants the near post first at about 50 yards from the gun. He then plants the further post as far from the gun as possible up to about 100 yards.

2 returns the gun to the loading position.

If the order "Replant aiming posts" is given, **6** doubles out and, at the signal from **3**, pulls up the posts, the further one first, and replants them.

15. PARALLEL LINES TO A NAMED GUN.

Section commander.

"...section (or No. ...)—Parallel lines to No. ..."

3 of the named gun re-lays for line, all guns being roughly laid at 20 degrees.

Zero line method.

1 of the named gun reports his angle right or left of his zero line. This angle is ordered to the other guns.

Aiming point method.

The section commander indicates an aiming point.

3 of the named gun swings his dial sight on to the aiming point and 1 reports the reading. This angle, corrected if necessary for parallelism, is ordered to the other guns.

Director method.

3 of the named gun swings his dial sight on to the director and 1 reports the reading. The director is set accordingly and individual angles are ordered to the other guns.

The other guns are then laid in the line of fire as already detailed.

16. TO CHECK PARALLEL LINES.

Section commander.

"...section—Check parallel lines to No. ..."

1 sets the elevation indicator at 20 degrees and brings the bubble to the centre of its run.

2 closes the breech and brings the gun to the firing position.

3 of the named gun lays on the dial sight of each gun in turn.

1 reports the angles to his section commander, who passes them to the section commanders concerned.

3 of each other gun lays on the dial sight of the named gun.

1 reports the reading to his section commander, who checks it with the angle taken by the named gun. The sum of the two angles should be 180 degrees. If necessary, he corrects the zero line angles.

17. TO LOAD.

Section commander.

"... section—(shell) ..., (fuze) ..., (propellant) ..., Charge ..."

1 repeats this order and at the correct moment orders "Load."

10 issues a shell; 4, 7, 8 and 9 carry the shell on the loading tray to the gun, 4 and 8 on the right, 7 and 9 on the left, 4 and 7 in front; 5 uncaps the fuze (if necessary).

4, 7, 8 and 9 place the front handles of the loading tray on the cradle slides; 4 and 7 quit the front handles.

5 picks up the rammer; 2, 4, 5 and 7 take post on the rammer; 8 and 9 steady the rear handles of the loading tray.

1 orders "Half way" and the shell is pushed forward until the base is 6 inches inside the face of the breech. 1 orders "Home" and the shell is rammed home.

5 replaces the rammer; 8 and 9 remove the loading tray.

11 issues a cartridge to 6; 6 shows it to 1, places it in the chamber and reports "In."

2 closes the breech, brings the gun to the firing position, places a tube in the vent and closes the lock.

After the first round, if there is no alteration in ammunition 1 orders "Load," repeating also any change in ammunition

which may be ordered. The cartridge will not be loaded sooner than is necessary to maintain the rate of fire.

NOTE.—At drill only wooden shell and drill cartridges will be loaded.

18. TO LAY THE GUN.

Indirect laying with sight clinometer.

Section commander.

"... section—... degs. ... mins. more right (or left),"

"Angle of sight ... degs. ... mins. elevation (or depression),"

"No. ..., add (or drop) ... degs. ... mins."

"(elevation) ... degs. ... mins."

3 puts on the deflection.

1 puts on the angle of sight and position correction (if any), sets the elevation indicator, looks up the gun correction and sets it on the sight clinometer.

1 elevates until the bubble of the sight clinometer runs to the front, depresses until the bubble is nearly in the centre of its run and reports "On" to 3.

3 cross levels, lays for line and stands clear.

1 completes the lay for elevation.

Indirect laying with Watkin clinometer.

Section commander.

"... section—Clinometer laying,"

"... degs. ... mins. more right (or left),"

"(elevation) ... degs. ... mins."

3 puts on the deflection and sets the elevation indicator.

1 applies the index correction (if any) to the elevation ordered and sets the clinometer.

3 elevates and depresses under the orders of **1** until the bubble is nearly in the centre of its run. **1** reports "On" to **3**.

3 cross levels, lays for line and reports "On" to **1**.

3 depresses steadily until **1** reports "On" a second time.

NOTE.—When laying with Watkin clinometer, the elevation ordered is the actual elevation at which each gun is to be laid.

Direct laying.

Section commander.

"... section—Reference point ..., Target,"

"Open sights, ... degs. ... mins. more right (or left),"

"(elevation) ... degs. ... mins."

1 orders "Take post by lay" and directs the gun into the line.

1 sets the elevation indicator. **3** sets the traversing gear at zero (or at 3 degrees traverse if the order "Target moving from ... to ..." is given) and puts the deflection on the open sights.

3 lays roughly, directing **2**, **4**, **5** and **7** to move the trail, and gives the signal "Take post." He then cross levels and lays direct over the open sights on the ground line of his portion of the target.

As soon as the gun is laid, **1** levels the sight clinometer by means of the micrometer head, thus taking the angle of sight.

If "Indirect laying" is ordered, **3** picks up an auxiliary aiming point with the dial sight. Unless a new angle of sight is ordered, **1** uses the angle of sight already taken.

19. TO FIRE.

No. 1.

"No. ...—Ready."

"No. ...—Fire."

1 orders "Ready" when he has satisfied himself that his gun is ready and shortly before it is his turn to fire.

3 removes the dial sight.

2 attaches the lanyard and steps clear of the wheel.

3 and 5 step clear and stand to attention facing the front.

When his turn arrives 1 glances at the breech and orders "Fire."

2 fires the gun, puts the lanyard round his neck, brings the gun to the loading position, opens the breech, ejects the tube and wipes the head of the vent axial with a wet cloth.

The gun is re-loaded and re-laid.

The gun will on no account be fired without the order from 1.

20. MISSFIRES.

If the gun fails to fire, 2 re-attaches the lanyard and pulls it. If the gun again fails to fire, 2 allows ten seconds to elapse, ejects the tube and examines it.

If the tube has failed to fire he examines the cap. If not fairly struck the lock is changed. If fairly struck a new tube is inserted. This tube is also tried twice; if it fails a second time, a pause of ten seconds is made and the lock is changed.

If the tube has fired a pause of three minutes is made; 1 then depresses the gun with the elevating hand-wheel until 2 can open the breech; after a further

pause of one minute 1 removes and examines the cartridge. If it is dry and serviceable, 1 re-adjusts it in the chamber. If it is damp or smouldering, he places it clear and orders a new cartridge to be loaded.

None of the detachment nor any cartridges should be in rear of the breech when it is opened.

21. TO CHANGE TARGET.

Section commander.

"... section—*Change target*,"

"... *degs. ... mins. more right (or left)*,"

or

"... *degs. ... mins. right (or left) of zero lines*."

1 orders "Take post to lay" and directs the gun into the approximate line.

1 sets the elevation indicator at 20 degrees and the sight clinometer at zero, and levels the clinometer bubble.

2 closes the breech and brings the gun to the firing position.

3 sets the traversing gear at zero. If the angle is given as "more right (or left)" he sets the dial sight at the recorded present target angle; if the angle is given from zero lines he sets the dial sight at the recorded zero line angle. He then turns the micrometer head of the dial sight through the angle ordered.

1 passes the reading to his section commander who corrects it if necessary.

The procedure is then as in Section 12. "To lay the gun in the line of fire."

22. TO STOP FIRING.

Section commander.

"... *section—Stop.*"

The detachment continue their duties but the gun is not fired until the order "Go on" is given.

23. TO STAND FAST.

Section commander.

"... *section—Stand fast.*"

All stand fast whatever they are doing.
At the order "Go on" work is continued.

24. TO STOP LOADING.

Section commander.

"... *section—Stop loading.*"

The detachment continue their duties. Any gun already loaded is fired at its proper interval, but no gun will be loaded until the order "Go on" is given.

25. TO EMPTY GUNS.

Section commander.

"... *section—Empty guns.*"

Any gun loaded is laid at the last elevation and line, and fired.

If a safety pin or cap has been removed before the order is given, the loading is completed and the gun fired.

26. TO STAND EASY IN ACTION.

Section commander.

"... section (or No. ...)—*Stand easy.*"

This order is given to indicate that firing is temporarily suspended.

Before opening fire again the order "Take post" will be given.

27. TO CEASE FIRING.

Before "Cease firing" is ordered guns must be empty.

Section commander.

"... section—*Empty guns, Cease firing.*"

2 closes the breech.

3 sets the traversing gear at zero, removes the No. 7 dial sight and sight clinometer and places them in their box.

2 and 5 take off the brakes.

4 and 5 place the cradle clamp in position; 2 elevates by the quick elevating gear until the cradle slides rest on the cradle clamp; 4 and 5 key up.

6 brings in the aiming posts if ordered.

All stores carried on the carriage are secured in position by the numbers responsible.

28. TO LIMBER UP.

Rear limber up.

Section commander.

"... section—*Rear limber up.*"

The limber is brought up and halts in rear of the position. 8, 9, 10 and 11 go to the drawbar of the limber; 11 unkeys

and the limber is man-handled to the gun, **8, 9, 10** and **11** at the drawbar, **6** and **7** pushing in rear.

When the limber is in the correct position **1** orders "Halt, limber up."

6, 7, 8 and **9** drop off the limber, and with **2, 3, 4** and **5** go to the trail, even numbers on the right, odd numbers on the left, highest numbers nearest the trail eye; **1** assists **10** and **11** to support the drawbar of the limber.

1 orders "Lift," and the trail is lifted.

1 orders "Lower," and the trail eye is lowered on to the limber hook; **9** keys up.

8 and **9** replace **1** at the drawbar.

The tractor is driven up and backed on to the limber, directed by **1**. **11** keys up.

All stores carried on the limber or in the limber box are placed in position by the numbers responsible.

The detachment form detachment rear.

Right, Left or Front limber up.

6 makes fast a dragrope to the trail eye; the trail is moved round to the required position and the procedure is then as in Rear limber up.

29. TO PICK UP THE VICKERS PLATFORM.

The platform is picked up by two detachments under the supervision of the section commander.

The transporting carrier is brought up and halted in rear of the position. The supporting beam and two chains are laid on the ground.

The following stores are brought up :—

Dragropes, heavy, pairs ...	1	Hammer	1
Picks	6	Spanner No. 289, Mk. II	1
Spades	2	1½ inch lashing.	

The earth round the edges of the beams is loosened.

The wheel platform is removed and placed clear.

The steel hawser is disconnected from the lower rear beam.

The locking bars and clamp bars are disconnected and the upper rear beam is lifted out by means of the bearers and placed across the supporting beam and chains.

The hinge pin is disconnected and the side beams are lifted out by means of the bearers and placed along side the upper rear beam, care being taken to see that the numerals on the ends of the beams correspond.

The lower rear beam is lifted out by means of bearers and placed in its correct position next to the side beams.

The four beams are clamped together by means of the chains, strongbacks and clamping screws.

The transporting carrier is brought into position over the supporting beam; the raising screws are attached to the links of the supporting beam and the beams are raised by means of the ratchets.

The wheel platform and bearers are placed in position on top of the axle and secured by its chain, strongback and clamping screws.

30. CASUALTIES TO DETACHMENTS.

Men sent up to replace casualties report to their section commanders, who order such changes of duties as they consider necessary.

Casualties are replaced as follows :—

Section commander ...	By the senior No. 1 of the section.
1	By a named successor (usually 11).
3	By a named successor.
With ten men	9 performs the duties of 9 and 10.
With nine men ...	9 performs the duties of 9 and 10, 11 performs the duties of 11 and 6.
With eight men	1 performs the duties of 1 and 3, 9 performs the duties of 9 and 10, 11 performs the duties of 11 and 6.

31. DISABLEMENT.

The extent of the disablement will depend on the time available and on the probability of recapture.

To disable the gun so that it can be brought into action immediately after recapture : Close the breech, remove the carrier hinge bolt and the lever breech mechanism.

To disable the gun so that it can be brought into action after repair : Remove the piston rod nut and ram nuts ; place the gun at extreme left traverse ; fire a round with full charge.

To destroy the gun : Place an H.E. shell in the muzzle ; load with H.E. and full charge ; fire the gun by means of a long lanyard from under cover. A length of telephone cable attached to the lanyard is suitable for the purpose.

NOTE :—The dial sight and clinometers should always be removed and taken away before abandoning a gun.

32. BLANK AMMUNITION.

(i) No officer, non-commissioned officer or gunner who has not been trained and passed in gun drill is to command a section or form part of a gun detachment firing blank ammunition at salutes or at training.

(ii) When firing B.L. blank cartridges, no gun is to be reloaded within 30 seconds after firing. Even after this interval no gun is to be reloaded until the chamber and bore have been sponged out and examined by 1.

(iii) In the event of missfire a further attempt should be made to fire the gun in its turn. In no case must the breech be opened for at least one minute with black powder and ten minutes with smokeless charges. No one must be in the rear of the breech when it is opened. In firing salutes, an officer or senior non-commissioned officer should be detailed for the special duty of timing the interval after a missfire and informing 1 of that gun when the breech may be opened.

CHAPTER III.—LAYING AND FUZE SETTING TESTS.

1. In every battery there should be at least six qualified layers per subsection, exclusive of serjeants and lance-serjeants. A list of layers should be kept. All layers, section commanders, serjeants and lance-serjeants should be tested periodically.

2. All officers and Nos. 1 must be thoroughly conversant with:—

- (i) The tests for and care of sighting gear and sights.
- (ii) The methods of obtaining parallel lines of fire.
- (iii) The application of gun corrections.

3. Layers will be tested by means of two tests: Test A will consist of four lays indirect, test B of two lays direct.

4. A maximum of 20 marks will be given for each lay in test A, and 10 marks for each lay in test B. In order to qualify a layer must obtain 75 marks.

5. The examiner should be assisted by an officer or senior non-commissioned officer with a stop-watch and record book, and by a penciller who will take down all orders given, for reference when checking the lay.

6. When laying indirect three or more aiming points should be selected to the rear and on either flank, if possible, and made known to all concerned.

7. Before beginning the tests at least five targets will be selected in the foreground at varying ranges and angles of sight, and covering a front of about 25 degrees; except in the case of targets representing guns these should be natural features of the ground. If it be necessary to use dummies they should be placed in positions such as the troops which they represent would naturally occupy on service. A reference point, approximately in the centre of the target zone, will be pointed out to the No. 1 and to the layer; targets will be indicated with reference to this point by means of the clock code.

8. When laying direct on any target (other than a gun target) which extends over a fairly wide frontage, great exactitude in direction will not be required as regards the point originally selected to lay upon, which may be anywhere in that portion of the target opposite to the gun being laid. Any subsequent lay on the same target must, however, be on the same point as the first.

9. The orders for the lay must be given out by the examiner clearly and distinctly, a short pause (about two or three seconds) being made after each separate order, thus: "*All guns, 20 degs. right*"—pause—" *All guns, 15 mins. more right*"—pause—" *Angle of sight, 1 deg. 20 mins. elevation*"—pause—" *20 degs. 20 mins.*"

All orders will be acknowledged by the No. 1 and acted on at once. Should the layer at any time be in doubt as to a particular order, he will refer to the No. 1, who may repeat to him any part of the order received. The No. 1 may, in turn, refer to the examiner.

10. After checking a lay, the examiner will elevate the gun about 15 minutes.

11. In the case of a change of target, the brakes must be taken off and put on again.

12. Layers will be examined in pairs (Nos. 1 and 3); for any incorrect part of a lay marks will be deducted only from the individual making the error.

13. The times allowed for each lay are as follows :—

Test A.				Test B.	
Lay 1. 1' 40"	Lay 2. 0' 35"	Lay 3. 1' 20"	Lay 4. 1' 50"	Lay 5. 0' 50"	Lay 6. 0' 25"

The layer will call out "Ready" as soon as he has finished laying the gun. The time will be taken from the conclusion of the orders for the lay until the word "Ready" from the layer.

14. One mark will be deducted :—

- (i) For every five seconds or fraction of five seconds beyond the time laid down for the particular lay.
- (ii) If the traversing gear is not within 30 minutes (with the Vickers platform, 2 degrees 30 minutes) of zero except in lays 2 and 6.
- (iii) For each mistake in the manipulation of the sighting gear or in the drill of the layer as laid down.

15. Two marks will be deducted :—

If the angle of sight has not been taken correctly when laying direct.

16. Ten marks will be deducted :—

If the aiming posts are not planted in line,

17. No marks will be given for the lay :—

- (i) If the sight is incorrectly set.
- (ii) When laying indirect, if the gun is not correctly laid for elevation and direction.
- (iii) When laying direct, if the gun is not laid for elevation within 3 minutes or for direction within 5 minutes.
- (iv) If the bubble of the cross level is not wholly visible.

EXAMPLES OF TESTS.

Laying tests.

The gun is placed on a firm platform. The examiner sets the elevation indicator at about 20 degrees and the remaining scales at zero.

Test A (indirect).

Orders.

Procedure.

Lay 1.

"Aiming point, ..."

"All guns, 90 degs. 10 mins. right."

The procedure will be as laid down under "To lay the gun in the line of fire."

The battery picket and auxiliary aiming point readings will be chalked up after 3 has reported "Ready."

"Aiming posts front."

The procedure will be as laid down under "To plant aiming posts." Time for this part of the lay is not taken.

Lay 2.

Orders.

"Charge two."
 "All guns, 1 deg. 10 mins.
 more right."
 "Angle of sight, 1 deg. 20
 mins. elevation."
 "25 degs. 40 mins."

Procedure.

The procedure will be as
 laid down under "To lay the
 gun."

Lay 3.

"Change target."
 "Charge three."
 "All guns, 2 degs. 15 mins.
 more left."
 "No. 3, 20 mins. more right."
 "Angle of sight, 10 mins. de-
 pression."
 "29 degs. 20 mins."

The procedure will be as
 laid down under "To change
 target" and "To lay the
 gun."

The target auxiliary aiming
 point reading will be chalked
 up after 1 has reported
 "Ready."

Lay 4.

"Change target."
 "All guns, 11 degs. 15 mins.
 right of zero lines."
 "Clinometer laying."
 "18 degs. 10 mins."

The procedure will be as
 laid down under "To change
 target" and "To lay the
 gun."

The target auxiliary aiming
 point reading will be chalked
 up after 1 has reported
 "Ready."

Test B (direct).

The reference point is described before orders are given.

Lay 5.**Orders.**

*Represent No. 3 gun in
action."*
*"Infantry lining hedgerow;
4 o'clock, 3 deys. to 5
degs."*
"Open sights."
"9 deys. 20 mins."

Procedure.

The procedure will be as
laid down under "To lay the
gun."
The bubble of the sight
clinometer will be brought
to the centre of its run before
reporting "Ready."

The examiner will put on a deflection and note the reading.

Lay 6.

*"All guns, 40 mins. more
left."*
"9 deys. 50 mins."

The gun will be re-laid on
the same point of the target
as in Lay 5.

The deflection ordered will
be such as will enable the
layer to lay by means of the
traversing gear.

Fuze setting test.**Orders.**

"Fuze 9.3."

Procedure.

The competitor will set the
fuses of six shell at the
graduation ordered.

Time, 1 min.

CHAPTER IV.—SIGHT TESTS.

The Watkin clinometer, sight clinometer and elevation indicator should be tested daily and after prolonged firing. The alignment tests should be carried out as often as possible.

The remaining tests (cross-levelling gear and parallel gear) should be carried out when required by a qualified artificer. These tests are given in the handbook.

Any adjustment to optical instruments must be carried out by a qualified artificer.

Test 1.—To test the Watkin clinometer.

Set the clinometer at zero, place it on the plane and elevate or depress the gun until the bubble is in the centre of its run. Turn the clinometer end for end; if the bubble is still in the centre of its run, the clinometer is in adjustment.

If the bubble is not in the centre, bring it so by means of the drum. One half the reading is the index error of the clinometer.

A correction for this index error must always be applied.

Test 2.—To test and adjust the sight clinometer.

With the sight clinometer bracket horizontal and the sight clinometer reading zero, the bubble of the sight clinometer should be in the centre of its run.

Place the sight clinometer set at zero in its bracket, and bring the bubble to the centre of its run by the elevating handwheel. Reverse the sight clinometer end for end; the bubble should still be in the centre of its run.

If the bubble is not in the centre, bring it so by turning the micrometer head. Note the reading and set the micrometer scales to half this reading. Bring the bubble to the centre of its run by the elevating handwheel. Slacken the nuts securing the micrometer scales and the screws securing the reader of the degree scale; shift the micrometer scales and reader to zero and re-clamp.

Test 3.—To test and adjust the elevation indicator.

With the sight clinometer reading zero and the bubble in the centre of its run, the elevation indicator should read the elevation at which the gun is laid.

Place a shell in the chamber to take up play in the elevating gear; cross-level the sight and set the sight clinometer at zero; lay the gun at 20 degrees elevation with a Watkin clinometer; bring the bubble of the sight clinometer to the centre of its run by the elevation indicator handwheel. The elevation indicator should read 20 degrees.

If the elevation indicator does not read 20 degrees, slacken the screws securing the retaining plate, revolve the skin until it reads 20 degrees and re-clamp.

Alignment tests.

Before beginning these tests the following preparations should be made :—

- (i) Place the carriage on a firm platform and manipulate it until it is level transversely (see iv).
- (ii) Select a well-defined object at least 1,500 yards distant on which to lay.
- (iii) If this distant object cannot be found, set up the target testing sights (see diagram) about 50 yards in front (or in rear) of the gun at right angles to the axis of the bore.
- (iv) If the carriage cannot be levelled transversely the top of the dial sight carrier and the target testing sights should be sloped to the same angle as the carriage.
- (v) Fix cross wires at the muzzle of the gun.
- (vi) Set the elevation indicator and the cowl of the dial sight at zero ; set the dial plate and micrometer scales of the dial sight and the deflection scale of the open sights at 1 degree left deflection (true zero).

NOTE.—In practice, tests 4 and 5 are carried out simultaneously.

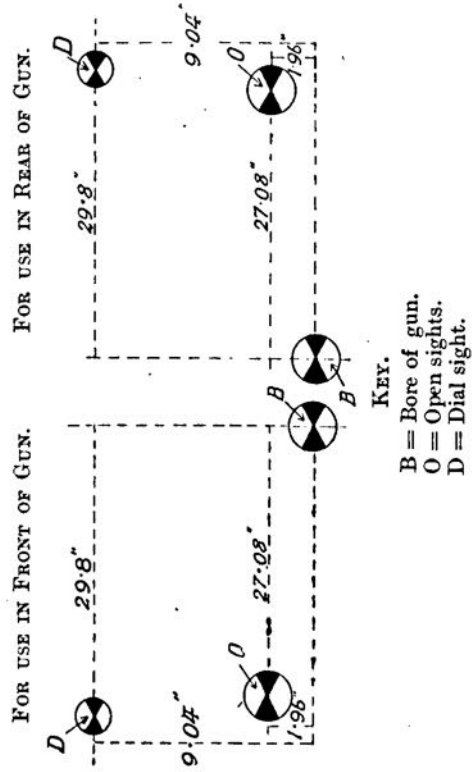
Test 4.—To test and adjust the dial sight and open sights for line.

The lines of sight through the dial sight and open sights should be parallel to the axis of the bore as regards line.

Lay the bore on the distant object for line by the traversing handwheel, using the intersection of the cross wires as a foresight and the axial vent as a hind sight. The lines of sight through the dial sight and the open sights should be on

TARGET TESTING SIGHTS.

8-INCH B.L. HOWITZER, MARKS VII-VIII ON CARRIAGES,
MARKS VII AND VIIa.



the distant object. When using the target testing sights, lay the bore on point B ; the dial sight should be on point D and the open sights on point O.

If the dial sight is not in alignment, turn the micrometer heads of the dial sight until the line of sight is correct, slacken the screws securing the reader of the dial plate and the nuts of the micrometers, shift the reader and micrometer scales to 1 degree left deflection and re-clamp. If the open sights are not in alignment, turn the eccentric at the front vertical pivot of the rocking bar until the line of sight is correct.

Test 5.—To test and adjust the dial sight and open sights for elevation.

The lines of sight through the dial sight and open sights should be parallel to the axis of the bore as regards elevation when the elevation indicator is at zero.

Lay the bore on the distant object for elevation by the elevating handwheel. The lines of sight through the dial sight and open sights should be on the distant object. When using the target testing sights lay the bore on point B ; the dial sight should be on point D and the open sights on point O.

If the dial sight is not in alignment, revolve the milled head at the top of the sight until the line of sight is correct, slacken the nut securing the micrometer collar, revolve the latter to zero and re-clamp. If the open sights are not in alignment, slacken the clamping nut at the bottom of the foresight, screw the foresight up or down until the line of sight is correct and re-clamp.

NOTE.—After adjusting the micrometer collar of the cowl of the dial sight the arrow on the view finder will not be opposite zero ; if confusion is likely to arise this arrow should be erased and a new one scribed opposite the zero mark.

CHAPTER V.—CARE OF EQUIPMENT.

1. CLEANING AND OILING.

Limber gunners should be intelligent and reliable men.

The projections on the exterior of the gun, which form guides for the latter when sliding in the cradle, should be kept clean and oiled and maintained in good working order; all working surfaces should be well lubricated and kept free from paint.

The bore should be kept clean and lightly greased. After firing, it should be scrubbed with caustic soda and hot water (one pound to a gallon), using the piasaba brush. When dry it should be lightly greased with mineral jelly.

Both plungers of the quick elevating gear should be kept well oiled with thin oil. The plungers, and the holes into which they fit, should be washed out occasionally with paraffin and re-lubricated.

No gritty substance, such as sand paper or bath brick, should be used for cleaning working surfaces.

All spare parts should be used periodically to ensure that they are in working order.

The axletrees should be greased frequently, the old grease, particularly from the channels of the pipe box, being removed before new grease is applied. If there is side-play between the wheel and the carriage, the linch pin should be withdrawn and the adjusting collar revolved to a suitable position to take up the play.

Heads of lubricators should be kept free from paint.

List of lubricators.

Fitting to be lubricated.	No.	Where situated.
Cradle	6	3 on each side for gun slides.
Recuperator slide	2	1 on front of each slide.
Capsquares	2	1 on each trunnion.
Quick elevating gear	5	1 on right plunger socket. 2 on left plunger socket 1 on each side of bracket, cross shaft.
Traversing gear—		
Spur wheel	1	5 Case, spur wheel.
Pinion	1	
Bearing handwheel spindle	1	
General	2	
Elevating and traversing gear—		Case, elevating and traversing gears.
Worm	1	8
Spindle worm	1	
Bearing handwheel	1	
Spindle arc pinion	1	
Bearing sight bracket	1	
Link nut	1	
General	2	
Bracket supporting sight	1	On top of bearing.
Elevating arc	1	On top of trunnion.
Brake gear	2	1 on each crosshead.
Cut-off gear	2	Inside cradle cap.
Saddle, pivot	1	Copper pipe in pivot.
Saddle clips	2	Right rear clip.
Bearing, breech mechanism lever	1	On top side of carrier.
Safety shutter	1	On top left side of carrier.
Carrier hinge joint	1	On top of hinge pin.
Breech screw and pintle of carrier.	1	On top side of breech screw.

2. THE ROCKING BAR SIGHT.

To avoid damage when travelling long distances, if the tactical situation permits, the sight bar and rocking bar sight complete are taken off by removing the front axis pin of the sight bar, and the split pins and collars of the rear axis pin of the sight bar and of the axis pin of the sight.

3. THE DIAL SIGHT AND CARRIER.

i. The No. 7 dial sight.

The dial sight when issued is in correct adjustment, water-tight, and with all the cells and joints secured with fixing screws.

It is very unlikely that the interior will require cleaning, and the dial sight must on no account be taken to pieces, except by a person in possession of an Ordnance College certificate stating that he is competent to do so.

The body of the dial sight should be cleaned with a clean soft cloth and a little oil, which must be rubbed off afterwards, care being taken that the glass is not touched. No gritty substance should be used.

The exteriors of eye lens and window should be cleaned with a chamois leather specially kept for the purpose. Great care must be taken that no oil or grease is allowed to touch the glasses. Fingers though apparently clean and dry leave marks on the lens which will impair the definition of the sight.

When not in use the dial sight in its carrier should be kept in store box No. 5.

ii. The No. 5 carrier.

If the sight is loose in the bracket it may be due to:—

- (a) The clamping screw head working out of its recess, making it impossible to clamp up. The remedy is to press the head into the recess and clamp.
- (b) The bracket being worn or strained, owing to working the sight about when taking it out of the bracket or over-straining the clamping lever. In this case a clamp to compress the bracket should be fitted if available; if not, one side of the bracket should be tapped lightly and evenly with a hammer by an artificer, with the clamping screw loosened.

4. THE BREECH MECHANISM.

i. General precautions.

The breech mechanism should be dismantled periodically in order that it may be thoroughly cleaned.

The threads of the breech screw should be free from burrs. Should the screw not work easily when the obturator has been detached, the defect may often be remedied by careful filing by an artificer, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered up when possible to prevent dust and grit getting into the breech fittings. A cover is provided for this purpose.

The obturating pad should be examined to see that the canvas covering is intact and in working order. If the canvas cover is found to be loose or to overlap either of the protecting discs, the obturator should be changed.

The spare pad should be kept under compression in the box obturator.

The protecting discs should be carefully examined and should be replaced if the steel rings are eroded, burred or cracked.

When fitting the pad and discs on the axial vent, care must be taken that they are assembled in the correct order. The face of the pad marked "front" should be towards the muzzle. One or more steel adjusting discs may be required between the obturator and the face of the breech screw when the pad is compressed by firing, but the obturator should always turn freely.

The obturating pad should be a close fit in the coned seating of the chamber when the breech is closed. To ascertain this, lightly cover the seating with a mixture of oil and tallow; close and open the breech; the outer end of the pad should be covered with grease from contact with the greased seating of the chamber. If it is found that the pad does not fit the seating closely, adjusting discs should be added until the breech closes with some difficulty. The breech should then be opened and closed until it works easily. Before use, the pad and disc should be well covered with tallow.

Every opportunity should be taken to keep the obturator and axial vent cool. This can be done by pouring water over it in position, or by sousing it thoroughly with a sponge cloth during or after firing.

The obturator should never be dismantled when hot.

When a new pad is fitted, it must be expanded with a full charge.

ii. To dismantle the breech mechanism.

Before removing the mechanism the breech must be opened and the breech mechanism swung into the loading position.

Vent T axial and obturator:—Remove the keep pin from the pin retaining axial vent-nut and withdraw the latter clear of the recesses in the axial vent nut. Unscrew the axial vent nut and remove it to the rear. Remove the spring vent axial. Withdraw the axial vent and obturator from the front end of the breech screw.

Breech screw:—Insert a screwdriver in the slot of the pin actuating retaining plate, press in the pin and partially revolve it by means of the screwdriver until the indicating arrow on the pin corresponds with the middle of the word "dismantle" on the breech screw. Withdraw the breech screw from the front end of the carrier.

Roller:—Remove the keep pin and roller axis pin, and withdraw the roller.

Lever breech mechanism:—Remove the keep pin and nut from the crankshaft and withdraw the breech mechanism lever.

Lever breech mechanism bearing, crankshaft and cross-head:—Remove the keep pin and securing screw of the breech mechanism lever bearing. Withdraw the bearing and crankshaft from the carrier. At the same time remove the crosshead from the inner end of the crankshaft from inside the carrier.

Carrier:—Remove the split pin from the hinge bolt and withdraw the hinge bolt from the top. Remove the carrier and bearing washer.

iii. To assemble the breech mechanism.

The breech mechanism is assembled in the reverse order.

iv. To dismantle the lock P.H. and slide box V.

To remove the lock and slide box :—Open the lock. Remove the screw securing slide box. Unscrew the lock and slide box from the stem of the axial vent.

To remove the lock from the slide box :—Remove the axis pin of the extractor. Press down the knob of the plunger retaining cap until it is vertical and remove the lock and extractor from the slide box.

To dismantle or change the striker :—Remove the lock from the slide box. Unscrew the lever actuating lock with striker complete (left-handed thread). Remove the split pin of the striker cap and withdraw the cap. Withdraw the striker complete from the lever actuating lock. Unscrew the nut striker. Withdraw the rebound collar, mainspring and collar mainspring from the striker.

To dismantle the actuating lever :—Remove the split pin. Remove the pin guide retaining catch. Withdraw the plunger and spring.

v. To assemble the lock P.H. and slide box V.

The lock and slide box are assembled in the reverse order.

5. RECUPERATOR AND BUFFER.

General precautions.

i. Before firing :—

Care should be taken to see that the recuperator and buffer are correctly charged, that there is no leakage at the stuffing boxes or rear end of the liquid cylinders, that the isolating valve is open, that the cylinder block is firmly nutted up to the lug of the gun and the piston rod and rams to the front

cradle cap, that the cut-off gear is in adjustment and that no split pins are missing.

It is necessary to strain the oil before charging the recuperator or buffer.

During severe weather, recuperators and buffers should be protected as much as possible from the cold.

Recuperator and buffer cylinders should be washed out with paraffin or hot water to remove grit as opportunities offer.

ii. In action :—

Fault.	Cause.	Remedy.
Incorrect length of re-coil.	Cut-off gear out of adjustment.	Adjust by the sleeve.
Gun fails to run out.	Loss of pressure.	Pump up pressure, if necessary refilling with liquid.
Gun runs out sluggishly.	Loss of pressure. Excessive friction in the slides.	Pump up pressure. Clean and lubricate.
	Excessive friction in the stuffing boxes.	Repack the stuffing boxes.
	Bent piston rod or recuperator ram.	Replace or straighten the bent rod.
Gun runs out violently.	Throttle valve not working correctly.	Replace spring throttle valve.

If the buffer tank or pipe is damaged the isolating valve must be closed.

iii. When guns are resting in action :—

Cool the bore. Allow air to escape from the buffer by the snifting valve. Replenish the buffer if necessary. Tighten packings if necessary. Test the air pressure after the gun has cooled.

6. THE RECUPERATOR.

i. General precautions :—

Before the front cradle cap is removed the gun must be secured to the cradle so as to prevent it from slipping back. This is done by putting a bar through the holes for the cradle clamp and wedging a block of wood between the bar and the gun.

If the cradle cap is to be left off for a long time, the elevating handwheel should be taken off.

ii. To charge the recuperator with liquid :—

Secure the gun to the cradle and level the cradle longitudinally and transversely with a clinometer. Disconnect the cut-off gear, piston rod and rams. Remove the cradle cap. Discharge any air pressure in the air chambers by removing plug F and opening the by-pass valve G. Remove the plugs from holes D and E.

Remove the left-hand plug H; attach the pump connection and adapter and pump in about 32 pints of oil; disconnect the adapter and replace the left-hand plug H quickly to avoid losing oil.

Remove the right-hand plug H; attach the pump connection and adapter and pump in oil until it overflows at D

and E; disconnect the adapter and replace the right-hand plug H quickly. Replace the plugs in holes D and E.

Care should be taken to see that the recuperator is correctly charged as too much oil will cause serious damage and put the gun out of action. When correctly charged it should contain 64 pints of oil.

iii. To charge the recuperator with air :—

Before charging the recuperator with air, it is important to see that the securing collars are in the correct position on the recuperator rams, in order to prevent the rams from being forced out to the rear when under pressure.

Attach the air pump to the brackets on the trail. Remove plug F and attach the adapter and pressure gauge; connect the pump pipe to the adapter. Slacken the locking nut, open the by-pass valve G and pump until the gauge registers 695 lbs. per sq. in. Close valve G, disconnect the pipe from the adapter and place the cap on the adapter. Let the pressure down slowly to 685 lbs. per sq. in. by opening valve G slightly and slacking back the cap on the adapter. When the pressure reads 685, close valve G, tighten the locking nut, remove the adapter with pressure gauge and replace plug F.

When charging by air bottle, care must be taken to open the cock gradually to avoid damage to the gauge.

iv. To test the air pressure :—

Remove plug F and attach the adapter and pressure gauge. Blank the outer end of the adapter with the cap. Slacken the locking nut, open valve G and the gauge should register 685 lbs. per sq. in.

If the pressure is correct, close valve G, tighten the locking nut, remove the adapter and gauge and replace plug F.

If the pressure is not correct, close valve G, connect up the air pump and make up the pressure to 685 lbs.

Loss of pressure may be due to faulty rubbers ; if the fault is in the stuffing boxes oil will leak over the rams ; if on the heads of the rams, oil will leak from the perforated caps in rear.

v. To replenish air pressure lost by leakage:—

Proceed as for charging the recuperator with air, but, before opening valve G to admit air to the recuperator, pump the pressure in the pipe up to 685 lbs. per sq. in.

If the air pressure falls below 550 lbs. discharge the air pressure and check the amount of liquid in the recuperator by removing plugs D and E and levelling the cradle.

vi. To empty the recuperator:—

Secure the gun to the cradle, disconnect the cut-off gear, piston rod and rams, and remove the cradle cap. Discharge the air pressure by removing plug F and opening valve G. Remove the recuperator stuffing boxes and plugs H, and run off the oil. Lift the trail and rock the cradle up and down to ensure the complete emptying of the recuperator passage.

vii. To replace a ram packing:—

Secure the gun to the cradle, disconnect the cut-off gear, piston rod and rams, and remove the cradle cap. Discharge the air pressure and remove the securing collars of the rams. Attach to the gun a hauling rope to the rear and a check rope to the front. Empty the liquid from the recuperator, remove the attachment between the gun and the cradle and haul the gun and recuperator body to the rear until the rear

closing caps are clear of the cradle. Close the isolating valve and disconnect the copper pipe from the isolating valve and buffer. Remove the split-pin and cap, force the ram out from front to rear and remove it. Make fast the check rope, remove the packing, insert fresh packing and re-assemble the various parts. Re-charge the recuperator.

vii. To renew the hemp packing in a recuperator gland and the L leather or rubber in a recuperator stuffing-box :—

These operations are similar to those in section 7 (iv) and (v) below, except that the air must be discharged before removing the securing collar from the ram.

7. THE BUFFER.

i. To fill the buffer :—

Remove the filling hole plug in the top of the tank, see that the isolating valve is open and elevate the gun about 5 degrees. Press in the snifting valve and pour oil into the tank until it overflows at the snifting valve. Release the snifting valve, fill the tank and replace the filling hole plug. About 53 pints of oil are required to fill the buffer and tank.

ii. To empty the buffer :—

Lay the gun horizontal, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Remove the cradle cap and unscrew the stuffing box. Run the oil off into suitable vessels. Replace the cradle cap and re-assemble.

iii. To tighten the packing cap :—

Lay the gun horizontal, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Remove

the cradle cap and tighten the packing cap by means of the spanner provided. Replace the cradle cap and re-assemble.

iv. To renew the hemp packing in the buffer gland :—

Elevate the gun to a convenient position, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Close the isolating valve. Remove the cradle cap, unscrew the packing cap, remove the spring, sleeve and defective packing, and renew. Replace the sleeve, spring and packing cap, replace the cradle cap and re-assemble.

v. To renew the L leather or rubber in the stuffing box :—

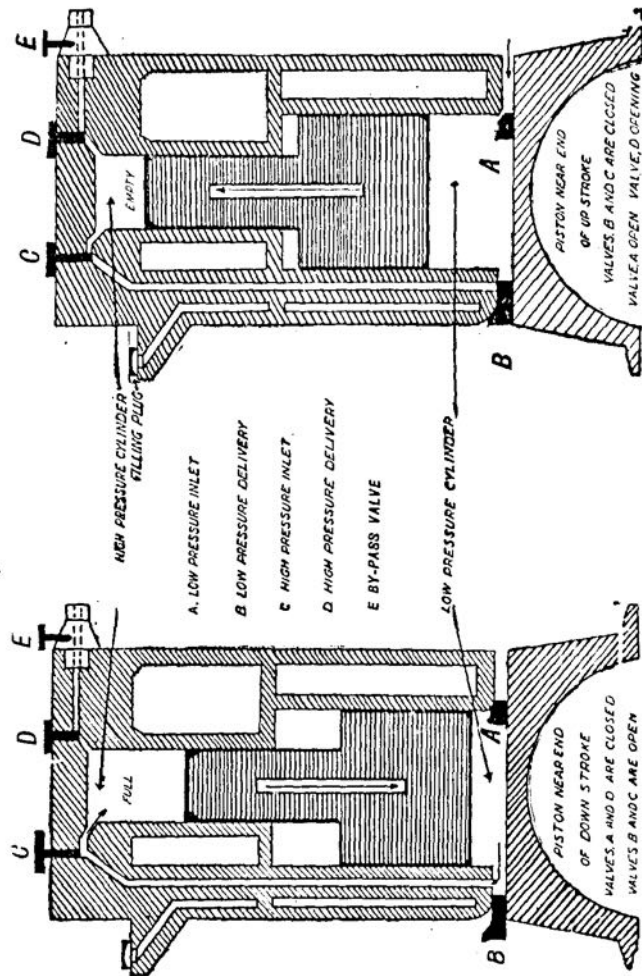
Elevate the gun to a convenient position, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Close the isolating valve. Remove the cradle cap. Remove the packing cap and spring and unscrew the stuffing box together with the defective packing. Renew the packing. Replace the stuffing box, spring and packing cap. Refill the buffer, replace the cradle cap and re-assemble.

8. THE AIR PUMP.

A dust cover and two lifting bars are provided with the pump. The cover must be kept on when the pump is not in use.

The water jacket must be kept filled when the pump is in action. In cold weather empty the jacket immediately after action and close valve A to prevent dirt and grit entering the cylinder when standing. Open again when putting the pump into action and set the sight feed lubricator to give eight drips per minute.

Before charging the recuperator it is advisable to test the pump system as follows: Close the air charging valve of the



recuperator. Work the pump slowly until the gauge registers 690 lbs. per sq. in. If the system is in good working order, the gauge hand should remain stationary, or only creep back very slowly. Should the hand fall back quickly the system should be examined for external faults. Faults may be located by smearing wheel grease over the joints; air bubbles will be observed where there is a leak.

Great care should be exercised in using the gauge. When taking or releasing pressure the valve should be opened gently. in order to prevent damage to the gauge.

If the pump only gives 20 lbs. pressure, valves B and C are faulty. If the pump only gives 200 lbs. pressure valve D is faulty. If no air is delivered valve A is faulty. If the valves are proved to be in order, look to the packing rings of the piston. In the event of valve D going out of order, and no spares being available, replace it with valve B; valve C should not be used for this purpose.

If necessary, the valves should be lightly ground in and coated with thin oil.

9. DISMOUNTING AND MOVING THE GUN.

i. To dismount the gun by rollers :—

Stores required.

Picks ...	...	1	Skids, 6-in. by 9-in. ...	4
Shovels ...	...	1	„ 4-in. by 5-in. ...	8
Iron-shod levers ...	...	2	„ 3-in. by 6-in. ...	4
Handspikes ...	...	4	Rollers, 3 ft. by 6-in. ...	2
Planks, 10 ft. ...	...	2	Luff tackles ...	4
„ 6 ft. ...	...	2	Dragropes, heavy, pairs	1
Levers, 14 ft. ...	...	1	Lashings, 1½ in. ...	10
Scotches ...	...	4		

Men required, 11.

Lay the gun approximately horizontal longitudinally, put on the brakes and remove the breech mechanism and rocking-bar sight. Place the small end of an iron-shod lever in the breech, leaving about 12 inches projecting; make fast the double blocks of two luff tackles with $1\frac{1}{2}$ -in. lashing to the iron-shod lever as check ropes, lay the single blocks on top of the wheels for the moment and take a turn with the running ends round the axletree arms.

Disconnect and remove the front cradle cap. Replace the recuperator ram nuts and make fast a piece of $1\frac{1}{2}$ -in. lashing to each ram.

Place the small end of an iron-shod lever in the muzzle leaving about 12 inches projecting; make fast the double blocks of two luff tackles with $1\frac{1}{2}$ -in. lashing to the iron-shod lever, lashing the hooks close up to the lever. These tackles are to be used as hauling tackles.

Place the single blocks on top of the wheels and lash them with $1\frac{1}{2}$ -in. lashing, passing the lashing round the felloes and through the hooks of both hauling and check tackles.

Pass the running ends outside the wheels towards the rear.

Put one man on the running end of each check tackle in front of the axle tree.

Place the ends of two 3-in. flats under the sides of the cradle on top of the lugs of the cradle clamp, arranging the flats so that their inner ends are flush with the inside of the lugs. Elevate the gun until the cradle rests on top of the flats.

Place two 10-ft. planks on top of the trail side by side in prolongation of the gun, one end resting on the top of a 6-ft. plank placed across the trail immediately in rear of the cradle clamp, the other end supported on a pile of skidding sufficiently high to ensure that the underside of the planks clear the tops of the brackets for the iron-shod levers (about 1 ft. high will

usually be enough). Place two 3-in. flats upon the trail under the centre of the 10-ft. planks to act as a support for the latter. Place eight 4-in. by 5-in. skids, overlapping, on their edges on top of the 10-ft. planks.

Put the remainder of the men on the running ends of the hauling tackles. Ease off on the check tackles and take in on the hauling tackles until the nut securing the gun to the recoil arrangements is just clear of the cradle. Close the isolating valve and disconnect the copper pipe from the isolating valve and buffer. Disconnect the nut, place the small end of a 14-ft. lever against the projection for securing the gun to the recoil system, and by pushing with the lever and hauling on the pieces of lashing attached to the recuperator Rams move the recoil system up to the front until the front guides are just clear of the recuperator slides.

Continue hauling the gun to the rear until a 3-ft. by 6-in. roller can be placed on top of the 4-in. by 5-in. skids in front of the lug on the breech of the gun. Apply a 14-ft. lever as a lever of the first order under the breech ring, in prolongation of the axis of the piece, using a 3-ft. by 6-in. roller as a fulcrum. Take the weight on the lever, depress the gun slightly and clear away the 3-in. flats from under the cradle, place in a 3-ft. by 6-in. roller on top of the 4-in. by 5-in. skids and elevate until the gun rests on top of this roller.

Clear away the lever and fulcrum. Ease off on the check tackles until the breech roller is near the front end of the breech guide.

Great care must be taken at all times to see that no weight is taken on the dust excluders joining the breech and muzzle guides.

Apply the lever as described above and run the breech roller down to the breech end of the breech guide. Continue

easing off on the check tackles until the front of the muzzle guide is within one inch of the rear end of the cradle.

Place a 3-ft. by 6-in. roller under the breech end of the muzzle guide, elevating or depressing the cradle as required by the elevating handwheel. After the first roller has been placed in position, No. 1 should take post at the elevating and traversing handwheels, and while the gun is still within the cradle guides, he should see-saw the handwheels to prevent the guides seizing in the event of the roller not moving at right angles to a line parallel with the centre line of the cradle.

Continue easing off down the 4-in. by 5-in. skids. Adjust the rollers as required, the breech roller with the lever as already detailed, and the muzzle roller by applying handspikes as levers of the second order under the muzzle with the 10-ft. planks as a fulcrum.

When the breech is near the ground, make arrangements for removing the gun.

ii. To remove the gun with a lorry :—

If the local situation permits the lorry to be backed up to the trail of the gun, a similar arrangement to the above can be employed, with the exception that the trail should be raised and supported upon short skidding and the 10-ft. plank led direct into the lorry.

NOTE.—The weight of the gun without breech mechanism is 3 tons 3 cwt. 3 qrs.

iii. To mount the gun.

The procedure is the reverse of that described in section 9 (i).

APPENDIX.

CARRIAGE OF STORES.

1. Stores carried on the carriage.

Article.	No.	Where carried.
Brush, piassaba	1	Inside centre of trail.
Brush, rammer and sponge	1	On top of trail, left side.
Can, lubricating, No. 9	1	Inside centre of trail.
Levers, iron-shod	4	On top of trail, centre.
Rimers, vent	2	In pocket on right side of trail.
Stave, end, No. 15	1	On top of trail, right side.
Stave intermediate	1	On top of trail, right side.
Tray, loading	1	On top of iron-shod levers.

2. Stores carried on the limber.

Article.	No.	Where carried.
Axe, felling	1	On rear of limber.
Axe, pick	1	Under limber.
Box, grease	1	Under limber, off side, rear.
Brush, water, carriage	1	Under limber, near side, front.
Can, lubricating, No. 3	1	Under limber, near side, rear.
Hook, bill	1	Under limber, off side, front.
Posts, aiming	2	On rear of limber, in straps for felling axe.
Rifles, in covers, in clips	2	On front of limber.
Ropes, drag, heavy, pairs	1	On splinter bar.
Shovels	2	On sides of limber.

3. Stores carried in limber box.

Article.	No.	Where carried.
Adapter, oil, filling	1	Loose.
Adapter pressure, gauge	1	Loose.
Bit, vent, 18-in. (or 17-in.)	2	In cleats, left lower compartment.
Box, obturator	1	In straps, right compartment.

Article.	No.	Where carried.
Box, spare springs, washers, &c. ...	1	In recess, centre compartment.
Chalk for recording angles ...	—	In recess, centre compartment.
Clinometer, Watkin, large, in case ...	1	Loose.
Funnel, filling, cylinder, No. 3 ...	1	In cleats, centre compartment.
File, bastard, half-round, 8 or 10-in. ...	1	Loose.
Fuze keys ...	3	Loose.
Gauge, pressure ...	1	In felt-lined cleats, right compartment.
Hammer, claw ...	1	Loose.
Lanyards, firing ...	2	Loose.
Measure, filling, hydraulic buffer, No. 1 ...	1	In cleats, right compartment.
Pins, keep, split, sets ...	1	In tin box, loose.
Screwdrivers, G.S., 6-in. ...	1	In cleats, left compartment.
Screwdrivers, sight, No. 1 ...	1	In cleats, left compartment.
Spanners, McMahon ...	1	Loose.
Spanners, buffer, recuperator and carriage— Nos. 1-16 and 21-23 ...	19	In cleats, left lower compartment.
Spanners, sight, Nos. 1, 3 and 4 ...	3	In cleats, left lower compartment.
Tallow, Russian, for obturator, tins ...	—	Loose.
Tube pocket, with strap ...	1	Loose.
Tommy, No. 38 and bar ...	1	In cleats, left lower compartment.
Tommy, carriage ...	1	In cleats, left lower compartment.
Tool withdrawing split pins ...	1	Loose.
Waste ...	—	Loose.
Wrench, breech mechanism, No. 137 ...	1	In cleats, left lower compartment.

Article.	No.	Where carried.
Wrench, breech mechanism, No. 138	1	In cleats, left lower com- partment.
Wrench, breech mechanism, No. 199	1	In cleats, left lower com- partment.
Buffer, hydraulic—		
Rings, packing, L section ...	2	}
Rings, compressed packing ...	2	
Springs, gland ...	1	
Gear, elevating and loading—		
Springs, plunger (L.H.) ...	1	}
Springs, plunger (R.H.) ...	1	
Recuperator—		
Rings, packing, L section ...	8	} In tray.
Rings, packing, U section ...	12	
Rings, compressed packing ...	2	
Springs, gland ...	1	
Springs, spiral ...	1	
Springs, piston, leather ...	1	
Springs, valve throttle ...	1	

MILITARY BOOKS, published by Authority—continued.

(As to prices in brackets, see top of page 2.)

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The Durham Light Infantry.
The East Lancashire Regiment.
The East Surrey Regiment.
The Hampshire Regiment.
The Highland Light Infantry.
The King's Own (Royal Lancaster Regiment).
The King's Own Scottish Borderers.
The Lancashire Fusiliers.
The Leicestershire Regiment.
The Loyal North Lancashire Regiment.
The Northamptonshire Regiment.
The Oxfordshire and Buckinghamshire Light Infantry.
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The Prince of Wales's Own (West Yorkshire Regiment).
The Prince of Wales's Volunteers (South Lancashire Regiment).
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The Queen's (Royal West Surrey Regiment).
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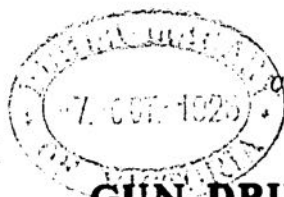
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THE WAR OFFICE,
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GENERAL INSTRUCTIONS.

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Practical instruction in the equipment should be given to each recruit before any attempt is made to instruct him in gun drill. In teaching the duties of each man at the gun the instructor should try to impart the instruction by reasoning rather than by a long explanation in words. By means of questions he should try to draw from the recruit the correct answers as to the performance of his duties, being careful to lead the man's mind into the desired channel of thought. Should this attempt fail, the instructor should give a demonstration emphasizing the points the recruit has not grasped. Such demonstrations should deal with the work of each man in the detachment; and all men under instruction should, in turn, carry out the work of each particular man.

Instruction in gun drill should begin as soon as the men are conversant with all parts of the equipment, and can handle in the best and quickest manner each of the working parts of the gun. Once the work of each man has been thoroughly mastered, it should not take long for the recruit to learn the actual drill.

It is most important that a marked distinction should be drawn between instruction and drill.

During the former the language used should be as simple as possible, and the meaning of all technical terms which are necessary must be carefully explained. A conversational

tone should be adopted and in no circumstances whatever should anything in the nature of long quotations from drill books be allowed. The men should be permitted to assume an easy attitude and their interest should not be allowed to flag. They should be encouraged to ask questions.

At drill, on the contrary, rigid discipline must be maintained, orders must be clear and decisive and the detachments made to work steadily, smartly and rapidly. At the same time the utmost accuracy is essential and any deviations from the methods laid down must at once be checked.

CHAPTER I.—GENERAL DUTIES.

This chapter summarizes the duties of the section commander and each man in the detachment. It is only intended as a guide to the instructor, who should use his own words in explaining the various duties to the men.

The detachment is composed of eleven men. The service of the gun is divided between them as follows :—

1	...	...	...	...	...	in command.
2	...	...	...	...	...	the breech.
3 and 4	...	...	...	...	...	the sights.
5, 7 and 8	...	...	...	...	...	the trail.
6 and 11	...	...	...	...	...	the cartridges.
7, 8, 9 and 10	...	...	...	...	...	the shell.

On coming into action all small stores, not actually required for each round, will be placed in a convenient position, normally on the right of the gun.

The duties of the section commander and each man are as follows :—

DUTIES OF SECTION COMMANDER.

NOTE.—On service it may not always be possible for section commanders to be with their sections in action, and it may be inadvisable to withdraw a No. 1 from his gun to act as section commander. In this case, such of the following duties as affect both guns will be performed by the G.P.O. (gun position officer) and such as affect individual guns by the Nos. 1.

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A 2

1. He **COMMANDS** his section and is responsible for the serviceability of its **EQUIPMENT** and the correctness of its **DRILL**.

2. He places himself where he can best see and hear the **B.C.** or **G.P.O.**, and will only move about when necessary for the supervision of his section. In ordinary circumstances he should be on the flank of his section nearest the command post.

3. He will acknowledge orders from the command post by saluting with the hand nearest the **G.P.O.**, finishing with the hand vertically above the head.

He only passes **ORDERS** when he sees that his Nos. 1 or the neighbouring section commander have failed to acknowledge.

4. He supervises the **TESTING** and **ADJUSTMENT** of the sights of his section.

5. He keeps a **RECORD** of the **MUZZLE VELOCITY**, **DROOP** and **JUMP** of his guns and also of their **ZERO LINE READINGS** to the **AUXILIARY AIMING POINT** and **BATTERY PICKET**. He will not keep any record of orders during a shoot.

6. He reports the **CREST ANGLES** to the **G.P.O.** when ordered to do so.

7. He is **RESPONSIBLE** that, before fire is opened on any target, his guns are layed in the **DIRECTION ORDERED**.

This is best done not by inspection of the sights, but by comparing the line of his two guns and the flank guns of the neighbouring sections by looking along the line of each with reference to some distant object either in front or rear.

8. He CONTROLS his section in action.

This control is best carried out by watching and listening rather than by personal inspection of sights, &c., *e.g.*, as regards deflection corrections, observation of which hand is used by 3, will ensure deflections being put on in the correct direction. As regards elevation, comparison of the elevations called out will expose any considerable error.

9. When his section is RANGING, if one gun miss-fires, he will fire BOTH ELEVATIONS from the other gun, the higher elevation first.

10. At BATTERY FIRE he will report to the G.P.O. when one of his guns MISSES ITS TURN.

11. He will REPORT to the G.P.O. when either of his guns goes OUT OF ACTION or when he finds that an ERROR has been made which is likely to have AFFECTED THE SHOOTING.

DUTIES OF 1.

1. He COMMANDS and is responsible for the entire service of his gun.

2. He gives the WORDS OF COMMAND detailed for him in Chapter II, and repeats all ORDERS affecting his detachment which have not been heard by the men concerned. His orders must be given clearly, but no louder than is necessary to enable his detachment to hear.

He assists in passing orders down the battery when necessary.

He acknowledges all orders by saluting. He will salute with the hand nearest the gun position officer, finishing with the hand vertically above the head.

3. He is responsible:—

- (i) That the BUFFER is properly filled, that there is no leakage at the stuffing box, that the buffer is firmly nutted up to the lug of the gun, and the piston rod to the front cradle cap.
- (ii) That the RECUPERATOR is correctly charged with liquid and air, that there is no leaking at the stuffing boxes or rear end of the liquid cylinders, and that the rams are nutted up to the front cradle cap.
- (iii) That the ACTUATING GEAR of the piston rod is properly assembled.
- (iv) That the SIGHTS are tested. This is done under the supervision of the section commander.

4. On coming into action he procures the ADAPTER and PRESSURE GAUGE, buffer and recuperator SPANNERS and GUN CORRECTION BOARD.

5. The GUN PLATFORM must be firm and level, and a "fishtail" must be constructed for the shoe under the trail to run on during recoil. This must be large enough to cover all switches. If the platform is not level he manipulates the recoil scotches so as to prevent side-slip.

6. He ascertains, when ordered, the CREST ANGLE, and reports it to the section commander.

7. He selects the auxiliary aiming point and records on the slate the ZERO LINE angles from the auxiliary aiming point and battery picket.

8. Before the gun is laid on a NEW TARGET he gauges the line of fire, and directs the gun into the line. One foot

at the trail-eye corresponds to 4 degrees of traverse ; on the Vickers platform the holes in the rear beam are 4 degrees apart.

9. (i) He applies :—

(a) The GUN CORRECTION, except when laying by field (or large) clinometer.

(b) The POSITION CORRECTION which, if required, is ordered in the form :—

“ POSITION CORRECTION. No.....plus (or minus)mins.”—

and is applied to all elevations ordered, but is cancelled when a fresh target is ordered.

(c) Corrections during fire for effect, which are ordered in the form :—

“ No.....add (or drop).....mins.”

These are cancelled when a fresh elevation is ordered.

(ii) When laying by field (or large) clinometer he applies the INDEX CORRECTION (if any) of his clinometer and passes corrected elevations to 4.

10. When an angle of sight is ordered, he examines the setting of the SIGHT CLINOMETER. He occasionally examines the settings of the ELEVATION INDICATOR and DIAL SIGHT.

11. He supervises the preparation and supply of AMMUNITION. As time fuzes deteriorate rapidly when unprotected from damp, only such as are required for immediate use will be uncovered. When one group of ammunition is nearly expended, he reports particulars of the next group to be used.

12. He sees that the caps of No. 106 fuzes have been removed. He supervises **LOADING**.

The shell should be rammed home vigorously with a good travel. The sound of the driving band engaging the rifling should be distinctly heard. Irregularity in ramming causes irregular shooting, especially when the gun is worn. An improperly rammed shell may slip back when the gun is elevated and cause a premature.

He sees that the correct charge is loaded.

13. He gives the order to **FIRE**. The gun will on no account be fired without his order. Before giving this order he sees that the red lines on the breech and breech screw coincide, showing that the breech is properly closed, and that the gun is in all respects ready.

14. He is responsible that the **INTERVAL** between rounds is properly kept as regards his own gun. When a salvo or quick rate of battery fire (less than 5 seconds interval) is ordered, he extends his right arm above his head as soon as his gun is ready to fire.

15. At intervals he checks the **LENGTH OF RECOIL**. He compares the elevation given by the recoil indicator with the elevation on the brass elevation arc situated below the sight.

16. If the run-out during the last few inches is either sluggish or violent, he adjusts the **VALVE, ADJUSTING RUN-OUT**.

17. He watches the movement of the **CARRIAGE** on recoil and adjusts the recoil scotches as required.

The position of the scotches depends on the individual platform, but the following distances, measured from the point where the wheel touches the ground to the front edge of the scotch, may be taken as a guide for placing the rear scotches :—

Sixth charge, 6 feet ; fifth charge, 5 feet, and so on.

In wet weather grit should be placed under the scotches to prevent them slipping.

18. When RAPID or PROLONGED FIRING takes place he takes every opportunity of attending to his equipment. The chamber, mushroom head and breech block should constantly be sponged with water. If the gun is hot the bore should be cooled with water when "Stand easy" is ordered.

DUTIES OF 2.

1. He works the BREECH MECHANISM and FIRES the gun. He is responsible for the near BRAKE and the breech and muzzle COVERS. With 5 he tests and adjusts the OBTURATING PAD and applies DRAGROPES. He assists 5, 7 and 8 to LIFT and TRAVERSE the trail and to RAM.

2. At preparation for action :—

- (i) He straps the TUBE POCKET round his waist and fills it with tubes.
- (ii) He places the LANYARD round his neck and tucks the ends into his belt.
- (iii) He sees that the VENT BIT, RIMER and OIL CAN are in the pockets on the right trail-arm.

3. On coming into action :—

- (i) He procures the breech mechanism WRENCHES, McMahon SPANNER and SPONGE CLOTH.
 - (ii) He places his HANDSPIKE, point inwards and bevel up, one yard clear of the handspike socket on the right of the trail; and the DRAGROPE outside the handspike.
 - (iii) He places the CRADLE CLAMP on the right of the gun.
4. (i) To OPEN the BREECH :—He takes hold of the lever breech mechanism with the left hand, thumb uppermost, and slides the hand down so as to press down the catch retaining, at the same time pulling the lever to the rear and then swinging it round to the right as far as it will go.
- (ii) To CLOSE the BREECH :—The above procedure is reversed. The breech must on no account be slammed.

5. He puts on the right BRAKE as soon as the gun is laid in the line of fire.

6. He assists 5, 7 and 8 to RAM. The shell is rammed home as follows :—

As soon as the loading tray is in position, 7 and 8 quit the front handles, and with 2 and 5 step on to the trail, 2 and 8 on the right, 5 and 7 on the left, 2 and 5 nearer the breech.

5 places the head of the rammer against the base of the shell, and at the order from 1 "Half way" the four numbers push the shell forward until the base is 6 inches inside the face of the breech.

They then reach out and grasp the rammer as far to the rear as convenient, inner hands back up, and outer hands back down, facing the rear. **1** orders "Home" and the shell is rammed home with full force.

7. At the order "READY," he passes the loop of the firing wedge over the striker cap and pulls it towards him until the cap passes the projections on the wedge. He steps clear of the wheel and stands facing the front. He holds the toggle in his right hand and grasps the centre of the lanyard with his left hand.

8. At the order "FIRE" he jerks the lanyard smartly. The gun will on no account be fired without the order from **1**.

9. He oils and cleans the BREECH MECHANISM when necessary during firing.

10. After each round he wipes the head of the VENT AXIAL with a wet sponge cloth.

DUTIES OF **3**.

1. He LAYS and is responsible for the SIGHT COVER. He directs **4** when planting AIMING POSTS. He assists **1** to test the SIGHTS.

2. On coming into action he places the No. 7 DIAL SIGHT and carrier in the bracket.

3. (i) He lays for line. At DIRECT LAYING he also lays for ELEVATION. He lays for line on the left edge of the aiming point unless otherwise ordered.

- (ii) At INDIRECT LAYING with SIGHT CLINOMETER, he sets the dial sight at the angle ordered. As soon as 4 has brought the bubble of the sight clinometer approximately central he lays roughly for line. He cross-levels the sight and lays accurately for line. He reports "Set."
 - (iii) At INDIRECT LAYING with FIELD (or large) CLINOMETER he sets the dial sight and sight clinometer at the angles ordered. Under the orders of 4 he elevates and depresses until the bubble of the field clinometer is approximately central. He levels the sight clinometer by means of the elevation indicator. He roughly lays for line, he cross-levels the sight and lays accurately for line. He reports "Set," and under orders from 4 depresses until the bubble of the field clinometer is central.
 - (iv) At DIRECT LAYING he sets the open sight at the deflection ordered. He lays roughly on the target. After 4 has reported "Set" he cross-levels the sight and lays accurately for line and elevation. He reports "Ready."
4. (i) When setting the dial sight by means of the QUICK RELEASE he moves the micrometer head through one complete turn to ensure that the teeth have re-engaged correctly.
- (ii) When SETTING a right deflection on the dial sight he turns the right micrometer head away from him with his right hand; when setting a left deflection he turns the left micrometer head towards himself with his left hand.

(iii) When **READING** a left angle on the dial plate he reads the minutes off the left micrometer scale ; when reading a right angle he reads the minutes off the right micrometer scale.

(iv) When **LAYING** for **LINE** he turns the top of the traversing hand wheel towards himself last.

5. For the first round, the pointer of the **TRAVERSING GEAR** must be within 30 minutes of zero when the lay is completed, except when engaging G.F. or similar targets.

6. At **CHANGE TARGET**, if the angle is given as "More right (or left)," he turns the micrometer head of the dial sight through the angle ordered. If the angle is given from zero line, he sets the dial sight at the recorded zero line angle and then turns the micrometer head of the dial sight through the angle ordered.

7. **CROSSHEADS** are fitted to aiming posts to compensate for lateral movement of the sight. Both crossheads have similar markings and numbers. He notes which corresponding pair of markings are in line and uses them to lay on. He directs 4 to clamp the crossheads low down, so that the bottom of the far one is just visible over the top of the near one.

8. The following are the signals used by 3 :—

SIGNAL.	MEANING.
(i) When directing 2 and 8 (or 5 and 7) to move the trail :—	
Palm of the hand in the required direction.	Trail right (or left).
Fist clenched	Stop traversing.
Smart tap on the thigh with the palm of the hand.	Take post.

SIGNAL.	MEANING.
(ii) When directing 4 to plant aiming posts :—	
Right arm extended to the right or left arm extended to the left.	Move in the direction indicated.
Arm dropped	Halt.
Both arms dropped sharply from above the head.	Plant.
Upward or downward motion of the arms with both arms extended laterally.	Raise or lower the crosshead.
Both arms extended above the head and moved laterally in the required direction.	Move head of post in the direction indicated.
Both arms extended sharply upwards.	Pick up.
Both arms extended to the front (or rear).	Move to plant the far aiming post.
Body turned about and both arms extended to the rear. (or both arms extended to the front).	Come in.

DUTIES OF 4.

1. He LAYS with 3 and plants AIMING POSTS. He assists 1 to test the SIGHTS.
2. On coming into action :—
 - (i) He places the SIGHT CLINOMETER in its bracket.
 - (ii) He places the AIMING POSTS with crossheads clamped and field (or large) CLINOMETER ready for use.

- (iii) When planting aiming posts he holds the post with the arm bent and elbow against the side at a convenient height, so that it hangs vertically with the point just clear of the ground. He moves to the right or left as directed by **3** until signalled to "Plant," when he allows the post to slip through the fingers until the point touches the ground. He then completes the planting.
3. (i) He lays for ELEVATION except at DIRECT LAYING.
- (ii) At INDIRECT LAYING with SIGHT CLINOMETER he sets the sight clinometer and elevation indicator at the angles ordered. He elevates the gun until the bubble of the sight clinometer runs to the front. He depresses the gun until the bubble is nearly in the centre of its run. As soon as **3** reports "Set," he depresses the gun until the bubble of the sight clinometer is central. He reports "Ready."
 - (iii) At INDIRECT LAYING with FIELD (or large) CLINOMETER, he sets the field clinometer at the elevation ordered by **1**, and places it on the clinometer plane. He orders **3** to elevate the gun until the bubble of the field clinometer runs to the front and to depress the gun until the bubble is nearly in the centre of its run. As soon as **3** reports "Set" he orders him to depress the gun until the bubble of the field clinometer is central. He reports "Ready."

- (iv) At DIRECT LAYING he sets the elevation indicator at the elevation ordered. He reports "Set."
If ordered to take the angle of sight, he levels the sight clinometer by means of the micrometer head after the gun is layed.
- 4. (i) When SETTING the SIGHT CLINOMETER he turns the top of the micrometer head towards himself last, to take up backlash.
- (ii) When using the field (or large) CLINOMETER he sees that the clinometer plane and the base of the clinometer are free from grit or dirt, and that the clinometer is placed exactly on the positioning marks of the plane for each lay.
- (iii) When SETTING the ELEVATION INDICATOR he turns the top of the elevation indicator hand-wheel towards himself last.
- (iv) When LAYING he depresses last (top of the hand-wheel towards himself) with at least two complete turns of the hand-wheel. If the bubble of the clinometer over-runs the centre he rapidly gives the elevating wheel two complete turns of elevation, followed by one and a-half turns of depression before completing the lay.
- (v) He depresses the gun to the LOADING POSITION (about 5 degrees elevation), at the order "LOAD" or after the gun has been fired.

DUTIES OF 5.

1. He is responsible for the off BRAKE. He assists 2, 7 and 8 to LIFT and TRAVERSE the trail and to RAM.

2. He is responsible for the BREECH and CHAMBER, and assists 2 to test and adjust the OBTURATING PAD and apply DRAGROPES.

3. On coming into action :—

(i) He places his HANDSPIKE, point inwards and bevel up, one yard clear of the handspike socket on the left of the trail; and the DRAGROPE outside the handspike.

(ii) He places the RAMMER so that it rests on the rear of the trail, head uppermost.

4. He puts on the left BRAKE as soon as the gun is layed in the line of fire.

5. He UNCAPS FUZES just before the shell is placed in the bore.

On removing the cap of a No. 106 fuze he sees that the tape is correctly wound and that the ends of the shearing wire are visible. If a No. 106 fuze has become uncapped or the wire and seal is found to be broken, the fuze is to be regarded as dangerous and treated accordingly.

6. As soon as the loading tray is in position he steps on the trail. He receives the RAMMER from 1 and places the head of the rammer against the base of the shell. (At drill he places it against the face of the breech.) He hands the rammer back to 1.

DUTIES OF 6.

1. He is responsible for the supply of CARTRIDGES.

2. On coming into action he procures a SCREWDRIVER or KEY, METAL LINED CASE.

3. He, assisted by 11, sees that cartridges are :—

- (i) SORTED by nature of propellant and "group" number.
- (ii) STORED in boxes and protected from extremes of temperature and from damp.
- (iii) PREPARED correctly; all sections bearing a higher number than the charge ordered are removed.
- (iv) ISSUED from the group ordered.

4. When one group of cartridges is nearly expended, he REPORTS to 1 the particulars of the next group.

5. He carries CARTRIDGES to the gun and loads them from the left side. He holds the cartridge with the charge number upwards for 1 to check, but in wet weather he must keep the igniter dry. He places the cartridge in the chamber so that the igniter faces the vent and is just clear of the mushroom head. If the cartridge is thrown to the front of the chamber, either by 6 or by the closing of the breech screw, a miss-fire may occur.

DUTIES OF 7.

- 1. On coming into action he procures the FUZE KEYS.
- 2. He prepares SHELL and, with 8, 9 and 10, carries them to the gun. He assists 2, 5 and 8 to LIFT and TRAVERSE the trail and to RAM.
- 3. On coming into action he places his HANDSPIKE in rear of the trail, point to the front, bevel up, and two yards clear of the trail eye.

DUTIES OF 8.

1. He prepares SHELL and, with 7, 9 and 10, carries them to the gun. He assists 2, 5 and 7 to LIFT and TRAVERSE the trail and to RAM.

2. On coming into action he places :—

(i) His HANDSPIKE in rear of the trail, point to the front, bevel up, and two yards clear of the trail-eye.

(ii) The LOADING TRAY with the shell.

DUTIES OF 9.

1. He, assisted by 11, does any DIGGING required in the service of the gun. He prepares SHELL and, with 7, 8 and 10, carries them to the gun.

2. On coming into action he places PICKS and SHOVELS on the right of the carriage and 3 yards clear.

3. After loading he assists 10 to remove the LOADING TRAY.

DUTIES OF 10.

1. He is responsible for the preparation and supply of TUBES and SHELL and assists 7, 8 and 9 to carry shell to the gun.

2. At preparation for action he procures a BRUSH, HAMMER and FILE.

3. He sees that SHELL are :—

(i) Scrupulously CLEAN, especially the driving bands.
Brushes and water should be used if necessary.

- (ii) SORTED into groups by nature, driving band and weight.
- (iii) STORED standing up on clean planks.
- (iv) FUZED as ordered and protected from damp.
- (v) ISSUED from the group ordered.

4. When using No. 106 fuzes :—

- (i) He BREAKS the wire and seal on issuing the round. When a specified number of rounds have been ordered, that number only will be prepared. When preparing ammunition with No. 106 FUZE no safety cap is to be removed or the wire or seal broken until the round is about to be loaded. If a No. 106 fuze has become uncapped or the wire and seal is found to be broken, the fuze is to be regarded as dangerous and treated accordingly.
- (ii) He will put on one side shell with burred driving bands, and with wire or seal of No. 106 fuze broken, reporting particulars to 1. When opportunity offers the burrs will be removed under instruction from 1.

5. When one group of shell is nearly expended, he REPORTS to 1 the particulars of the next group.

6. After loading he, assisted by 9, removes the LOADING TRAY.

7. Before REPLACING shell in the wagon :—

- (i) H.E. shell except those fuzed with No. 106E fuze will be unfuzed.

- (ii) A shell fuze with No. 106 fuze, with wire or seal broken, is on no account to be replaced in limber, wagon or lorry.

DUTIES OF 11.

1. He is the COVERER and SECOND IN COMMAND of the detachment.
2. In action :—
 - (i) He assists 6 to prepare cartridges.
 - (ii) He assists 9 with any DIGGING required in the service of the gun.

CHAPTER II.—GUN DRILL.

Artillery Training lays down the principles of battery tactics, which vary little with different equipments. This chapter details the orders given and the procedure by which these orders are carried out in batteries armed with the 8-inch B.L. Howitzer.

The procedure must be memorized and strictly adhered to.

The executive order is shown throughout as being given by the section commander, as will normally be the case during training. When orders can be heard throughout the battery they will be acted upon without repetition. Instructors will invariably employ the orders detailed for the section commander, even when drilling a single detachment.

1. POSITIONS AT DETACHMENT REAR.

The detachment falls in two deep, one pace between ranks, 1 on the right and 11 on the left of the front rank. 1 is not covered.

When the gun is limbered up, the front rank is three paces in rear of the muzzle, 1 covering the off gun-wheel.

When the gun is in action, the front rank is one pace in rear of the trail eye, 1 covering the right gun wheel.

2. TO TELL OFF.

Section commander.

"...section—*Tell off.*"

1 numbers himself 1, the right-hand man of the rear rank 2, his front rank man 3, and so on.

3. TO CHANGE ROUND.

Section commander.

"...section—*Change round.*"

1 takes a pace to the rear with his right foot and a pace to the left with his left. The left hand man of the rear rank takes a pace to the front. At the same time the remainder of the front rank take a pace to the right and the rear rank a pace to the left.

(The detachment is then again told off.)

4. TO MOVE THE GUN WITH DRAGROPES WHEN LIMBERED UP.

Section commander.

"No....—*With dragropes, prepare to advance.*"

"No....—*Double man No....*"

2 and 5 hook the dragropes to the dragwashers on their own sides, the backs of the hooks downwards; 8, 9, 10 and 11 go to the engine draught connector of the limber; the remainder man the ropes, 2, 4 and 6 on the near side, 3, 5 and 7 on the off.

The detachment of the other gun of the section double to the named gun and man the ropes.

Section commander.

"*Walk march.*"

The carriage is moved to the front.

Section commander.

"*Halt.*"

The carriage is halted and the detachments remain at their posts.

Section commander.

"Detachments rear."

2 and 5 of the named gun replace the dragropes; both detachments double to their places and halt.

5. TO EXAMINE EQUIPMENT.

Examination of equipment will be carried out before leaving the gun park. When in action this procedure should be carried out at least once in every 24 hours, and advantage should be taken of any interval to examine and test equipment.

Section commander.

"...section—Examine equipment."

The gun is unlimbered and each man checks his stores.

The section commander supervises the testing of sights and grouping of ammunition.

1 sees the bore is clear, that the gun, buffer and recuperator are properly connected up and the cut-off gear in adjustment. He sees that the buffer and recuperator are correctly filled and charged and that there is no leakage from the glands. He tests and adjusts the sights. He generally supervises the work of the remainder of the detachment, satisfying himself that spare parts are interchangeable, small stores complete, and the equipment in all respects ready for action.

2 removes and replaces breech and muzzle covers and, with 5, removes and replaces the cradle clamp. He examines the right

brake. He examines the breech mechanism and, with 5, tests and adjusts the obturating pad. He examines the firing lanyard and firing tubes.

3 removes and replaces the sight cover. He examines the dial and open sights, apparatus illuminating sights, cross-leveiling and traversing gears. He assists 1 to test and adjust the sights.

4 examines the aiming posts, elevation indicator, sight and field (or large) clinometers and elevating gear. He assists 1 to test and adjust the sights.

5 examines the left brake, breech and chamber. He assists 2 with the cradle clamp and obturating pad.

6 and 11 examine and group the cartridges.

7, 8, 9 and 10 examine and clean shell. They group shell and fuzes as ordered by the section commander.

As soon as the examination is completed, the gun is limbered up and the detachment forms detachment rear.

1 collects reports, and reports to the section commander "No. ... ready for action," or otherwise.

6. TO PREPARE FOR ACTION.

Preparation for action will be carried out before moving into action.

Section commander.

"...section—*Prepare for action.*"

Each man checks his stores.

1 sees that the bore is clear and satisfies himself that the detachment and equipment are in all respects ready for action.

2 and 5 release the cradle clamp.

2 removes the breech and muzzle covers and straps them on the trail, examines the breech mechanism, fills the tube pocket, straps it round his waist and places the lanyard round his neck.

3 removes the sight cover and straps it on the trail.

4 depresses the gun and examines the aiming posts.

3 and **4** examine the sighting, elevating and traversing gears.

5 examines the chamber and threads of the breech.

6, 7, 8, 9, 10 and **11** examine ammunition.

As soon as preparation for action is completed, **2** closes the breech and, with **5**, replaces the cradle clamp. **4** elevates the gun.

The detachment form detachment rear.

1 collects reports from each man and reports to his section commander "No....ready for action," or otherwise.

7. TO LAY THE VICKERS PLATFORM.

The platform is laid by two detachments under the supervision of the section commander.

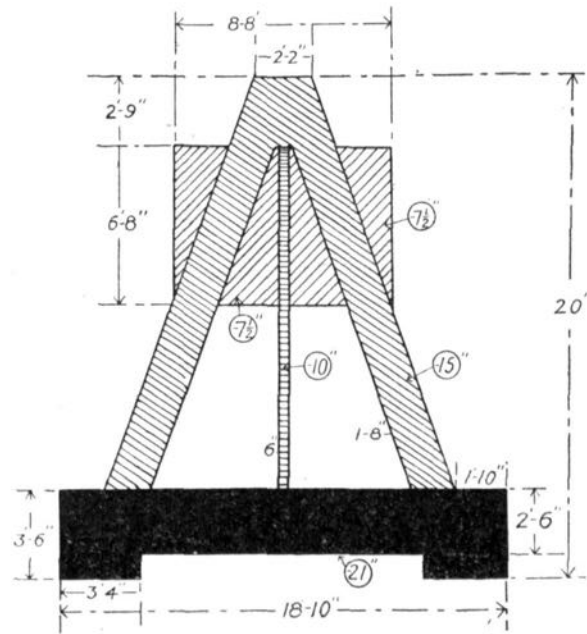
The platform is brought up on its transporting carrier and halted in rear of the position.

The following stores are brought up:—

Director	1	Picks	6
Tape, 100 ft.	1	Shovels	6
Field level	1	Spades	6
Aiming posts	3	Rammers, earth ...	4
Dragropes, heavy, pairs	1	Maul	1
Waterproof cover or tarpaulin		Hammer	1
Mineral jelly, waste and tracing tape.	1	Spanner No. 289, Mark II	1

DIAGRAM.

EXCAVATION FOR VICKERS PLATFORM.



(B 27/14)

A 5

The tarpaulin is laid out clear of the position and the stores are arranged on it.

The section commander lays out the centre line of the platform and traces the trenches.

The trenches are dug to the required depth and levelled in all directions; they should be kept as closely as possible to the dimensions traced and in particular the rear face of the rear trench should be clean cut.

The wheel platform and bearers are removed from the transporting carrier and the beams lowered to the ground.

The lower clamp bar and bolts are put into position and the lower rear beam is lowered into its trench by means of the bearers.

The side beams are lowered into their trenches by means of the bearers, their rear ends fitting into the recesses in the rear beam. The front ends are connected by the hinge pin which is passed through the eye on the steel hawser.

The beams are now tested for level and adjusted if necessary.

The upper rear beam is placed in position with its recesses fitting the rear steel angles of the side beams. The upper clamp bars are fixed and the bolts nutted up. The locking bars are secured.

The steel hawser is connected to the lower rear beam and nutted up.

The wheel platform is placed in position with its angle plates inside the side beams and its front face butting against the front angle plates of the side beams.

The earth is rammed well round the beams flush with their tops.

8. TO COME INTO ACTION.**Action rear.**

Section commander.

"...section—Action rear."

1 places himself so that he can see when his gun is in the required position. He then orders "Halt—Action rear."

All the men except **1**, **10** and **11** go to the trail, **2**, **4**, **6** and **8** on the near side, **3**, **5**, **7** and **9** on the off, **8** and **9** nearest the trail eye; **9** unkeys.

1 orders "Lift" and the trail is lifted and slewed clear of the hook; "Lower" and the trail is lowered to the ground. **9** keys up.

1 orders "Limber, drive on"; the limber advances five yards, halts for stores to be removed and proceeds to the wagon line under the direction of the battery serjeant-major.

2 and **5** remove the keys securing cradle clamp.

4 depresses the gun to the loading position.

2 and **5** remove the cradle clamp.

The stores are placed in position by the men responsible for them.

The detachment take up their positions in action.

Action right, Action left, Action front.

As soon as the trail has been lowered to the ground **2** makes fast a dragrope to the trail and the trail is moved in the required direction.

At "Action right" the trail is moved through a quarter of a circle to the left.

At "Action left" the trail is moved through a quarter of a circle to the right.

At "Action front" the trail is moved through a half circle to the right; but on a side slope the trail is moved downhill.

When training detachments in these movements, the detail given under "Action rear" must be modified with regard to movement of the limber and trail.

9. POSITIONS IN ACTION.

1 where he can best superintend the work of the detachment.

2 on the right of the gun, close to the breech, facing the front.

3 on the left of the gun, in rear of the dial sight, facing the front.

4 outside the left gun-wheel, in line with the elevating hand-wheel, facing the front.

5 on the left of the trail, one yard clear and facing the front.

6 and 11 with the cartridges.

7, 8, 9 and 10 with the shell.

10. TO FORM DETACHMENT REAR IN ACTION.

Section commander.

"...section—Detachment rear."

1 doubles to his place (one yard in rear of the trail eye and covering the right gun-wheel) and gives the order "No....—Double march."

At the order from 1 the remainder double to their places and halt.

11. TO TAKE POST FROM DETACHMENT REAR.

Section commander.

"...section—Take post."

The detachment double to their positions in action.

12. TO OBTAIN THE LINE OF FIRE.

The line of fire is obtained by one of the methods described in Artillery Training.

13. TO LAY THE GUN IN THE LINE OF FIRE.

Section commander.

"...section—Aiming point..., ...degs....mins. right (or left)."

1 orders "Take post to lay"; 2, 5, 7 and 8 pick up their handspikes and fit them in the bracket on the trail and stand by to traverse.

3 sets the dial sight as ordered.

4 sets the elevation indicator at 20 degrees and the sight clinometer at zero, and brings the bubble of the sight clinometer to the centre of its run by the elevating hand-wheel.

3 lays roughly on the aiming point, directing 2 and 8 (or 5 and 7) to traverse.

3 gives the signal "Take post"; 2, 5, 7 and 8 replace their handspikes.

2 and 5 put on the brakes. (With the Vickers platform 1 must first insert the spade pin in the nearest hole.)

3 brings the cross-level bubble approximately to the centre of its run and lays accurately for line with the traversing gear.

1 points out the auxiliary aiming points and battery picket to 3.

3 reports to 1 the readings of the dial sight from the battery picket and auxiliary aiming point; 1 records them on the slate.

The section commander goes to his guns and takes a note of the angles recorded.

If necessary, 1 orders "With dragrope, trail right (or left)." 2 (or 5) hooks a dragrope to the trail eye; all numbers except 1 and 3 man the rope and heave as directed by 1.

At the order "Take post to lay," 2, 5, 7 and 8 man the handspikes, 2 (or 5) replaces the dragrope and the remainder resume their posts.

14. TO ASCERTAIN THE LOWEST ELEVATION AT WHICH THE TRAJECTORY WILL CLEAR THE CREST.

Section commander.

"...section.—*Report crest angle.*"

4 sets the elevation indicator at zero.

1 lays the gun just clear of the crest by looking along the bottom of the bore, ordering 4 to elevate or depress as required.

4 brings the bubble of the sight clinometer central by the micrometer head.

1 reports the angle recorded on the sight clinometer to the section commander, who passes it to the gun position officer.

The gun position officer adds to the angle reported the elevation due to range to the crest, plus allowance for safety, and reports the resultant quadrant angle to the battery commander.

NOTE.—The section commander should order the correct angle of sight to the gun, after the crest angle has been taken.

15. TO PLANT AIMING POSTS.

Section commander.

"...section—Aiming posts front (or rear)."

6 doubles to the front (or rear) of his gun with two aiming posts and plants them as directed by **3** in line with the dial sight set at zero (or 180 degrees). He plants the near post first at about 50 yards from the gun. He then plants the further post as far from the gun as possible up to about 100 yards.

If the order "Re-plant aiming posts" is given, **4** doubles out and, at the signal from **3**, pulls up the posts, the further one first, and re-plants them.

16. PARALLEL LINES TO A NAMED GUN.

ZERO LINE METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Zero line method."

3 of the named gun relays for line.

1 of the named gun reports the angle right or left of his zero line.

This angle is ordered to the other guns.

AIMING POINT METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Aiming point method."

The section commander indicates an aiming point.

3 of the named gun relays for line, swings his dial sight on to the aiming point and 1 reports the reading. This angle, corrected if necessary for parallelism, is ordered to the other guns.

DIRECTOR METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Director method."

3 of the named gun relays for line, swings his dial sight on to the director and 1 reports the reading. The director is set accordingly and individual angles are ordered to the other guns.

DIAL SIGHT METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Dial sight method."

3 of the named gun relays for line. He then swings his dial sight on to the dial sight of each gun in turn.

1 reports these angles to his section commander who passes on their supplements to the section commander concerned.

3 of each other gun sets his dial sight at the angle ordered for his gun and lays on the dial sight of the named gun.

17. TO CHECK PARALLEL LINES.

Section commander.

"...section—Check parallel lines to No. ..."

4 sets the elevation-indicator at 20 degrees and brings the bubble to the centre of its run by the elevating hand-wheel.

3 cross-levels and relays for line.

3 of the named gun lays on the dial sight of each gun in turn. 1 reports the angles to his section commander, who passes them to the section commanders concerned.

3 of each other gun lays on the dial sight of the named gun. 1 reports the reading to his section commander, who adds it to the angle taken by the named gun. The sum of the two angles should be 180 degrees. If necessary, he corrects the zero line angles.

18. TO LOAD.

High Explosive.

Section commander.

"...section—H.E...., (fuze)...., (propellant)...., Charge...."

"...ranging (or method of fire)."

1 repeats the ammunition order and at the correct moment orders "Load."

4 brings the gun to the loading position (if necessary).

10 issues a shell; 7, 8, 9 and 10 carry the shell on the loading tray to the gun, 8 and 10 on the right, 7 and 9 on the left, 7 and 8 in front; 5 uncaps the fuze (if necessary).

7, 8, 9 and 10 place the front handles of the loading tray on the cradle slides; 7 and 8 quit the front handles.

1 passes the rammer to 5.

2, 5, 7 and 8 take post on the rammer; 9 and 10 steady the loading tray.

1 orders "Half way" and the shell is pushed forward until the base is 6 inches inside the face of the breech. 1 orders "Home" and the shell is rammed home.

5 hands the rammer to 1, who replaces it; 9 and 10 remove the loading tray.

6 shows the cartridge to 1, places it in the chamber and reports "In."

2 closes the breech; 4 brings the gun to the firing position; 2 places a tube in the vent and closes the lock.

During ranging (except with "time set" fuzes) the gun will be reloaded as soon as it has been fired.

During ranging (with "time set" fuzes) the gun will be reloaded as soon as the time setting has been ordered.

At a method of fire the gun will not be loaded sooner than is necessary to maintain the rate of fire.

After the first round:—

If there is no alteration in ammunition ordered, 1 only orders "Load."

If there is an alteration in ammunition ordered, 1 repeats the ammunition order for the first round only.

NOTE.—At drill the rammer will be placed against the breech ring in the action of ramming home; only drill cartridges will be loaded.

19. TO LAY THE GUN.

Indirect laying with sight clinometer.

Section commander.

"... section—... degs. ... mins. more right (or left.)"

"Angle of sight—... degs. ... mins. elevation (or depression)."

"Position correction—No.... plus (or minus)...mins."

"(Elevation) ... degs. ... mins."

1 applies the position correction and gun correction (if any) and passes the corrected elevation to 4.

3 puts on the deflection.

4 puts on the angle of sight, and sets the elevation indicator; elevates until the bubble of the sight clinometer runs to the front, and depresses until the bubble is nearly in the centre of its run.

3 cross-levels, lays for line and reports "Set."

4 depresses until the bubble is in the centre of its run and reports "Ready."

20. INDIRECT LAYING WITH FIELD (OR LARGE) CLINOMETER.

Section commander.

"... section—Clinometer laying—, ... degs. ... mins. more right (or left)."

"Angle of sight,—...deg....mins. elevation (or depression)."

"(Elevation) ... degs. ... mins."

1 applies the index correction (if any) to the elevation ordered and passes the corrected elevation to 4.

3 puts on the deflection and sets the sight clinometer.

4 sets the field clinometer and places it on the clinometer plane; orders 3 to elevate until the bubble runs to the front and to depress until the bubble is nearly in the centre of its run.

3 levels the sight clinometer by the elevation indicator hand-wheel, cross-levels, lays for line and reports "Set."

4 orders 3 to depress until the bubble is in the centre of its run, reports "Ready," and removes the clinometer.

NOTE.—When laying with field (or large) clinometer, the elevation ordered is the actual elevation at which each gun is to be layed.

Direct laying.

Section commander.

"... section— *Target...*"

"... *Reference point* — ...o'clock ... *degs.* ..."

"*Open sights*— ... *degs.* ... *mins.* more right (or left)."

"(*Elevation*) ... *degs.* ... *mins.*"

1 orders "Take post to lay" and directs the gun into the line.

3 puts on the deflection and sets the traversing gear at zero (or at 3 degrees traverse if the order "Target...moving from..." is given).

4 sets the elevation indicator and reports "Set."

3 lays roughly, directing 2 and 8 (or 5 and 7) to move the trail, and gives the signal "Take post." He then cross-levels and lays direct on the ground line of his portion of the target and reports "Ready."

If "Indirect" is ordered, 1 selects an auxiliary aiming point and points it out to 3.

3 turns the dial sight on to this aiming point. 4 sets the sight clinometer and elevation indicator at the angle of sight and elevation ordered, and the gun is then layed indirect with sight clinometer.

21. TO FIRE.

No. 1.

"No...."

"Fire."

1 orders "No...." shortly before it is his turn to fire.

3 removes the dial sight.

2 attaches the lanyard and steps clear of the wheel.

1, 3 and 4 step clear, 1 carrying the rammer (if necessary); all face the front.

When his turn arrives, 1 orders "Fire."

2 fires the gun, and puts the lanyard round his neck; 4 brings the gun to the loading position; 2 opens the breech, ejects the tube and wipes the head of the vent axial with a wet sponge cloth.

The gun will on no account be fired without the order from 1.

22. MISS-FIRES.

If the gun fails to fire, 2 re-attaches the lanyard and pulls it. If the gun again fails to fire, 2 allows ten seconds to elapse, ejects the tube and examines it.

(i) *If the tube has failed to fire* he examines the cap. If not fairly struck the lock is changed. If fairly struck a new tube is inserted. This tube is also tried; if it fails a second time, a pause of ten seconds is made and the lock is changed.

(ii) *If the tube has fired* a pause of three minutes is made; 4 then depresses the gun with the elevating hand-wheel until 2 can open the breech; after a further pause of one minute 1 removes and examines the cartridge.

If the cartridge is dry and serviceable, 1 re-adjusts it in the chamber. If it is damp or smouldering, he places it clear and orders a new cartridge to be loaded.

In the event of a tube failing to ignite the charge, care should be taken when extracting the tube not to stand directly in

rear of the gun, as the tube may fly out with some violence as soon as the lock is clear.

The vent channel sometimes becomes choked with residue from the cartridge. When this occurs, the taper portion should be cleared with a "Rimer," sufficiently to allow of the insertion of a tube, which, when fired, will remove the rest of the obstruction.

None of the detachment nor cartridges should be in rear of the breech when it is opened.

23. TO CHANGE TARGET.

Section commander.

"...section—Target..."

"(Ammunition)..."

"...degs...mins. right (or left) of zero lines."

1 repeats the ammunition order and orders "With drag-ropes trail right (or left)," if necessary. **2** and **5** take off the brakes. **1** directs the gun into the approximate line. He then orders "Take post to lay."

3 brings the traversing gear to zero and sets the dial sight to the recorded zero line angle and turns the micrometer head through the angle ordered. **3** lays roughly for line. **2** and **5** put on the brakes.

6, 7, 8, 9, 10 and **11** prepare ammunition.

Section commander.

"Angle of sight—...degs...mins. elevation (or depression)."

4 sets the sight clinometer.

1 checks the setting.

Section commander.

"...ranging (or Method of fire)."

"(Interval)..." (if required).

1 at the correct moment orders "Load."

The gun is loaded.

Section commander.

"Elevation (or Elevations)...degs...mins."

1 passes the elevation to 4.

4 sets the elevation indicator.

3 lays for line and reports "Set."

4 lays for elevation and reports "Ready."

24. TO STOP FIRING.

Section commander.

"... section—Stop."

The detachment continue their duties but the gun is not fired until the order "Go on" is given.

25. TO STAND FAST.

Section commander.

"... section—Stand fast."

All stand fast whatever they are doing.

At the order "Go on" work is continued.

26. TO STOP LOADING.

Section commander.

"... section—Stop loading."

The preparation of ammunition is suspended.

The detachment continue their duties. Any gun already loaded is fired at its proper interval, but no gun will be loaded until the order "Go on" is given.

27. TO EMPTY GUNS.

Section commander.

"... section—*Empty guns.*"

Any gun loaded is layed at the last elevation and line, and fired.

If a safety pin or cap has been removed before the order is given, the loading is completed and the gun fired.

28. TO STAND EASY IN ACTION.

Section commander.

"... section (or No. ...)—*Stand easy.*"

This order is given to indicate that firing is temporarily suspended.

Before opening fire again the order "Take post" will be given.

29. GUNS IN POSITION.

The procedure laid down in "Examine equipment" in the gun park must be carried out every 24 hours and when reliefs (if any) are carried out.

In addition 1 must see that the layers know the zero line angles to, and the position of, the auxiliary aiming point and battery picket, and that all men of the detachment are conversant with the position of the command post and ammunition supply.

1 will check the ammunition available for his gun.

30. TO PREPARE TO MOVE.

The section commander informs the Nos. 1 of the method of evacuating the position and whether a position of assembly is to be used.

Section commander.

"...section—*Prepare to move.*"

Ammunition and stores as ordered by the section commander are repacked.

Preparation for limbering up will be made as far as possible, but guns will remain in action until the order "Cease firing" is given.

31. TO CEASE FIRING.

Before "Cease firing" is ordered guns must be empty.

Section commander.

"...section—*Empty guns—Cease firing.*"

2 closes the breech.

3 sets the traversing gear at zero.

2, assisted by 5, replaces the cradle clamp.

4 elevates the gun until the cradle slides rest on the cradle clamp; 2 and 5 key up and take off the brakes.

4 brings in the aiming posts if ordered.

All stores carried on the carriage are secured in position by the men responsible.

32. TO LIMBER UP.**Rear limber up.**

Section commander.

"...section—*Rear limber up.*"

The limber is brought up and halts in rear of the position. **8, 9, 10** and **11** go to the engine draught connector of the limber; **11** unkeys.

The limber is man-handled to the gun, **6** and **7** pushing in rear.

When the limber is in the correct position **1** orders "**Halt, limber up.**"

6, 7, 8 and **9** drop off the limber, and with **2, 3, 4** and **5** go to the trail. **2, 4, 6** and **8** on the right, **3, 5, 7** and **9** on the left, **8** and **9** nearest the trail eye; **1** assists **10** and **11** to support the engine draught connector of the limber.

1 orders "**Lift,**" and the trail is lifted; "**Lower,**" and the trail eye is lowered on to the limber hook; **9** keys up.

8 and **9** replace **1** at the engine draught connector.

The tractor is driven up and backed on to the limber, directed by **1**. **11** keys up.

All stores carried on the limber or in the limber box are placed in position by the men responsible.

The detachment form detachment rear.

Front limber up.

Section commander.

"...section—*Front limber up.*"

2 hooks a drag rope to the trail.

The trail is moved through a half circle to the right.
*(The procedure is then as in Rear limber up.)**

Right limber up.

Section commander.

"...section—*Right limber up.*"

2 hooks a dragrope to the trail.

The trail is moved through a quarter of a circle to the right.
*(The procedure is then as in rear limber up.)**

Left limber up.

Section commander.

"...section—*Left limber up.*"

2 hooks a dragrope to the trail.

The trail is moved through a quarter of a circle to the left.
*(The procedure is then as in rear limber up.)**

33. TO PICK UP THE VICKERS PLATFORM.

The platform is picked up by two detachments under the supervision of the section commander.

The transporting carrier is brought up and halted in rear of the position. The supporting beam and two chains are laid on the ground.

The following stores are brought up:—

Dragropes, heavy, pairs ...	1	Hammer ...	...	...	1
Picks ...	...	6	Spanner No. 289, Mk. 11	1	1
Spades ...	...	2	1½ inch lashing.		

The earth round the edges of the beams is loosened.

* When detailing "Front (right or left) limber up," the instructor will modify the detail of "Rear limber up" as necessary, with regard to the movement of the limber and trail.

The wheel platform is removed and placed clear.

The steel hawser is disconnected from the lower rear beam.

The locking bars and clamp bars are disconnected and the upper rear beam is lifted out by means of the bearers and placed across the supporting beam and chains.

The hinge pin is disconnected and the side beams are lifted out by means of the bearers and placed along side the upper rear beam, care being taken to see that the numerals on the ends of the beams correspond.

The lower rear beam is lifted out by means of bearers and placed in its correct position next to the side beams.

The four beams are clamped together by means of the chains, strongbacks and clamping screws.

The transporting carrier is brought into position over the supporting beam; the raising screws are attached to the links of the supporting beam and the beams are raised by means of the ratchets.

The wheel platform and bearers are placed in position on top of the axle and secured by its chain, strongback and clamping screws.

34. CASUALTIES TO DETACHMENTS.

Men sent up to replace casualties report to their section commanders, who order such changes of duties as they consider necessary.

Casualties are replaced as follows :—

Section commander ... By the senior No. 1 of the section.

1 ... By a named successor (usually 11).

3 ... By a named successor.

With ten men	...	11 performs the duties of 10 and 11 .
With nine men	...	11 performs the duties of 10 and 11 . 1 performs the duties of 9 as well as his own. 3 steadies the loading tray.
With eight men	...	11 performs the duties of 10 and 11 . 1 performs the duties of 9 as well as his own. 3 performs the duties of 3 and 4 .

35. DISABLEMENT.

The extent of the disablement ordered will depend on the time available and on the probability of recapture.

To disable the gun so that it can be brought into action immediately after recapture: Close the breech, remove the carrier hinge bolt and the lever breech mechanism.

To disable the gun so that it can be brought into action after repair: Remove the nuts of piston rod and ram; fire a round with full charge.

To destroy the gun: Place an H.E. shell fuze 101E or 101B in the muzzle; load with H.E. fuze 101E or 101B full charge; fire the gun by means of a long lanyard from under cover. A length of telephone cable attached to the lanyard is suitable for the purpose.

NOTE:—The dial sight and clinometers should always be removed and taken away before abandoning a gun.

36. BLANK AMMUNITION.

1. No officer, non-commissioned officer or gunner who has not been trained and passed in gun drill is to command a section or form part of a gun detachment firing blank ammunition at salutes or at training.

2. When firing B.L. blank cartridges, no gun is to be reloaded within 30 seconds after firing. Even after this interval no gun is to be reloaded until the chamber and bore have been sponged out and examined by 1.

3. In the event of missfire a further attempt should be made to fire the gun in its turn. In no case must the breech be opened for at least one minute with black powder and ten minutes with smokeless charges. No one must be in the rear of the breech when it is opened. In firing salutes, an officer or senior non-commissioned officer should be detailed for the special duty of timing the interval after a missfire and informing 1 of that gun when the breech may be opened.

CHAPTER III.—LAYING TESTS.

1. In every battery there should be at least six qualified layers per subsection, exclusive of serjeants and lance-serjeants. A list of layers should be kept. All layers, section commanders, serjeants and lance-serjeants should be tested periodically.

2. All officers and Nos. 1 must be thoroughly conversant with:—

- (i) The tests for and care of sighting gear and sights.
- (ii) The methods of obtaining parallel lines of fire.
- (iii) The application of gun corrections.

3. Layers will be tested by means of two tests: test A will consist of four lays indirect, test B of two lays direct.

4. A maximum of 20 marks will be given for each lay in test A, and 10 marks for each lay in test B. In order to qualify a layer must obtain 81 marks.

5. The examiner should be assisted by an officer or senior non-commissioned officer with a stop-watch and record book, and by a penciller who will take down all orders given, for reference when checking the lay.

6. When laying indirect three or more aiming points should be selected to the rear and on either flank, if possible, and made known to all concerned.

7. Before beginning the tests at least five targets will be selected in the foreground at varying ranges and angles of sight, and covering a front of about 25 degrees; except in the case of targets representing guns these should be natural features of the ground. If it be necessary to use dummies they should be placed in positions such as the troops which they represent would naturally occupy on service. A reference point, approximately in the centre of the target zone, will be pointed out to the No. 1 and to the layers; targets will be indicated with reference to this point by means of the clock code.

8. When laying direct on any target (other than a gun target) which extends over a fairly wide frontage, great exactitude in direction will not be required as regards the point originally selected to lay upon, which may be anywhere in that portion of the target opposite to the gun being layed. Any subsequent lay on the same target must, however, be on the same point as the first.

9. The orders for the lay must be given out by the examiner clearly and distinctly, a short pause (about two or three seconds) being made after each separate order, thus: "*All guns, 20 degs. right of zero lines*"—pause—" *All guns, 15 mins. more right*"—pause—" *Angle of sight, 1 deg. 20 mins. elevation*"—pause—" *20 degs. 20 mins.*"

All orders will be acknowledged by the No. 1 and acted on at once. Should a layer at any time be in doubt as to a particular order, he will refer to the No. 1, who may repeat to him any part of the order received. The No. 1 may, in turn, refer to the examiner.

10. After checking a lay, the examiner will elevate the gun about 15 minutes.

11. Layers will be examined in pairs (Nos. 3 and 4); for any incorrect part of a lay marks will be deducted only from the individual making the error.

12. The times allowed for each lay are as follows :—

Test A.				Test B.	
Lay 1. 1' 40"	Lay 2. 0' 35"	Lay 3. 1' 20"	Lay 4. 1' 50"	Lay 5. 0' 50"	Lay 6. 0' 25"

The layer will call out "Ready" as soon as he has finished laying the gun. The time will be taken from the conclusion of the orders for the lay until the word "Ready" from the layer.

13. One mark will be deducted :—

- (i) For every five seconds or fraction of five seconds beyond the time laid down for the particular lay.
- (ii) If the traversing gear is not within 30 minutes (with the Vickers platform, 2 degrees 30 minutes) of zero except in lays 2 and 6.
- (iii) For each mistake in the manipulation of the sighting gear or in the drill of the layer as laid down.

14. Ten marks will be deducted :—

If the aiming posts are not planted in line.

15. No marks will be given for the lay :—

- (i) If the sight, clinometer, or elevation indicator is incorrectly set.
- (ii) When laying indirect, if the gun is not correctly layed for elevation and direction.
- (iii) When laying direct, if the gun is not layed for elevation within 3 minutes or for direction within 5 minutes.
- (iv) If the bubble of the cross-level is not central.

EXAMPLES OF TESTS.

Laying tests.

The gun is placed on a firm platform. The examiner sets the elevation indicator at about 20 degrees and the remaining scales at zero.

Test A (indirect).

Orders.

Procedure.

Lay 1.

"Aiming point, ..."

"All guns, 90 deys, 10 mins.
right."

The procedure will be as laid down under "To lay the gun in the line of fire."

The battery picket and auxiliary aiming point readings will be recorded on the slate after 4 has reported "Ready."

"Aiming posts front."

The procedure will be as laid down under "To plant aiming posts." Time for this part of the lay is not taken.

Lay 2.

Orders.

"Charge two."
 "All guns, 1 deg. 10 mins.
 more right."
 "Angle of sight, 1 deg. 20
 mins. elevation."
 "25 degs. 40 mins."

Procedure.

The procedure will be as
 laid down under "To lay the
 gun."

Lay 3.

"Represent No. 2 gun in
 action."
 "Target....."
 "Charge....."
 "All guns, 2 degs. 15 mins.
 more left."
 "Concentrate 10 mins. on
 No. 1."
 "Angle of sight, 10 mins. de-
 pression."
 "20 degs. 20 mins."

The procedure will be as
 laid down under "To change
 target" and "To lay the
 gun."

Lay 4.

"Target....."
 "All guns, 11 degs. 15 mins.
 right of zero lines."
 "Clinometer laying."
 "Angle of sight, 1 degree eleva-
 tion."
 "15 degs. 10 mins."

The procedure will be as
 laid down under "To change
 target" and "To lay the
 gun."

NOTE.—In lays 2, 3 and 4 layers should be exercised in
 laying from auxiliary aiming points or aiming posts at the
 discretion of the examiner.

Test B (direct).

The reference point is described before orders are given.

Lay 5.**Orders.****Procedure.**

Represent No. 3 gun in action. The procedure will be as laid down under "To lay the gun."
"Infantry lining hedgerow; 4 o'clock, 3 degs. to 5 degs."
"Open sights."
"9 degs. 20 mins."

The examiner will put on a deflection and note the reading.

Lay 6.

"All guns, 40 mins. more left." The gun will be re-layed on the same point of the target as in Lay 5.
"9 degs. 50 mins."

The deflection ordered will be such as will enable the layer to lay by means of the traversing gear.

CHAPTER IV.--SIGHT TESTS.

The field (or large) clinometer, sight clinometer and elevation indicator should be tested daily and after prolonged firing. The alignment tests should be carried out as often as possible.

At drill these tests should be carried out frequently to give officers and N.C.Os. practice in doing them accurately.

The remaining tests (cross-levelling gear and parallel gear) should be carried out occasionally, but adjustments must only be made by a qualified artificer. These tests are given in the Handbook.

Any adjustment to optical instruments must be carried out by a qualified artificer.

Test 1.—To test the field (or large) clinometer.

To ascertain the index error.

1. Set the clinometer to read zero (degrees and minutes) place the instrument on the clinometer plane of the gun, and by means of the elevating gear bring the bubble into the centre of its run. Turn the clinometer end for end. If the bubble does not remain in the centre of its run bring it there by moving the arm and slider (or drum). Note the net reading. Half this reading is the INDEX ERROR of the clinometer.

2. An alternative method may be employed. Procure a clinometer known to be in adjustment, set at zero and place it on the clinometer plane, and by means of the elevating

gear bring the bubble central. Remove the clinometer. The clinometer to be tested is now placed on the clinometer plane and the bubble brought central by moving the arm and slider (or drum). The actual reading of this instrument is the INDEX ERROR. A number of clinometers can be quickly and uniformly tested in this manner.

NOTE.—A clinometer when set to read its INDEX ERROR and bubble brought central will lay the clinometer plane horizontal.

The clinometer should be adjusted to have no INDEX ERROR, or if this is impracticable, the INDEX ERROR must be applied to all angles to be set on the instrument.

The method of eliminating or adjusting for INDEX ERROR is shown in the Handbook.

Test 2.—To test and adjust the sight clinometer.

With the sight clinometer bracket horizontal and the sight clinometer reading zero, the bubble of the sight clinometer should be in the centre of its run.

Place the sight clinometer set at zero in its bracket, and bring the bubble to the centre of its run by the elevating hand-wheel. Reverse the sight clinometer end for end; the bubble should still be in the centre of its run.

If the bubble is not in the centre, bring it so by turning the micrometer head. Note the reading and set the micrometer scales to half this reading. Bring the bubble to the centre of its run by the elevating hand-wheel. Slacken the nuts securing the micrometer scales and the screws securing the reader of the degree scale; shift the micrometer scales and reader to zero and re-clamp.

Test 3.—To test and adjust the elevation indicator.

With the sight clinometer reading zero and the bubble in the centre of its run, the elevation indicator should read the elevation at which the gun is layed.

Place a shell in the chamber to take up play in the elevating gear; cross-level the sight and set the sight clinometer at zero; lay the gun at 20 degrees elevation with a field (or large) clinometer; bring the bubble of the sight clinometer to the centre of its run by the elevation indicator hand-wheel. The elevation indicator should read 20 degrees.

If the elevation indicator does not read 20 degrees, slacken the screws securing the clamping ring, revolve the elevation ring until it reads 20 degrees and re-clamp.

Remove the shell from the chamber.

NOTE.—The sight should occasionally be tested for wear of the link motion. Having carried out Test 3 as above, lay the gun at 15 degrees elevation with a field (or large) clinometer; bring the bubble of the sight clinometer to the centre of its run by the elevation indicator hand-wheel. The elevation indicator should read 15 degrees. If it does not, note the reading. Repeat this procedure at 30 degrees elevation. If the error at 15 degrees exceeds 5 minutes, or if at 30 degrees it exceeds 15 minutes, the sight should be sent to Ordnance Workshops for repair.

Alignment tests.

Before beginning these tests the following preparations should be made :—

- (i) Place the carriage on a firm platform.
- (ii) Select a well-defined object at least 1,500 yards distant on which to lay.

- (iii) If this distant object cannot be found, level the carriage transversely, and set up the target testing sights (see diagram) about 50 yards in front (or in rear) of the gun at right angles to the axis of the bore.
- (iv) If the carriage cannot be levelled transversely the top of the dial sight carrier and the target testing sights should be sloped to the same angle as the carriage.
- (v) Fix cross-wires at the muzzle of the gun.* (And at the breech if the target testing sight is placed in rear.)
- (vi) Set the elevation indicator and the cowl of the dial sight at zero; set the dial plate and micrometer scales of the dial sight and the deflection scale of the open sights at 1 degree left deflection (true zero).

Test 4.—To test and adjust the dial sight and open sights for line.

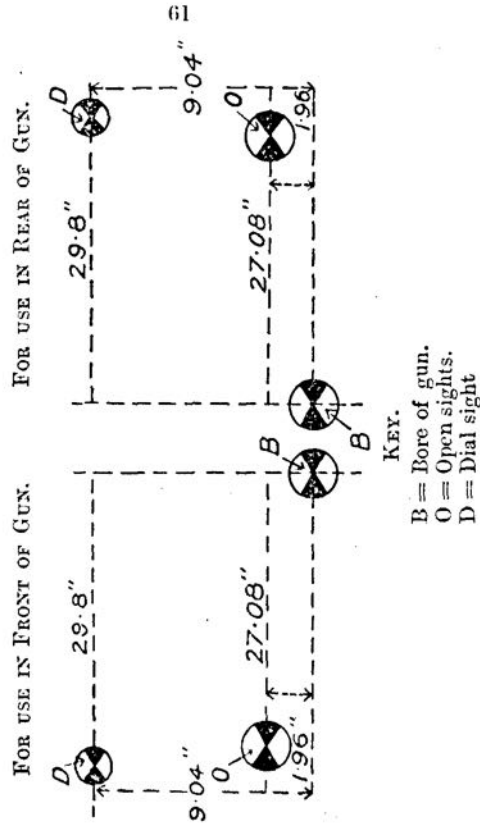
The lines of sight through the dial sight and open sights should be parallel to the axis of the bore as regards line.

Place the No. 7 dial sight in position. Lay the bore on the distant object for line by the elevating hand-wheel and traversing gear, using the intersection of the cross-wires as a fore sight and the axial vent as a hind sight. The lines of sight through the dial sight and open sight should be on the distant object.

* The cross-wires must be removed on completion of test.

TARGET TESTING SIGHTS.

8-INCH B.L. HOWITZER, MARKS VII-VIII ON CARRIAGES,
MARKS VII AND VIIa.



When using the target testing sights lay the bore on point B; the dial sight should be on point D and the open sight on point O. (If the target testing sight is placed in rear lay the bore on point B by the intersection of the cross-wires on muzzle and breech.)

If the dial sight is not in alignment, turn the micrometer heads of the dial sight until the line of sight is correct, slacken the screws securing the reader of the dial plate and the nuts of the micrometers, shift the reader and the micrometer scales to 1 degree left deflection, and re-clamp.

If the open sights are not in alignment, turn the eccentric at the front vertical pivot of the rocking bar until the line of sight is correct.

Test 5.—To test and adjust the dial sight and open sights for elevation.

The lines of sight through the dial sight and open sights should be parallel to the axis of the bore as regards elevation when the elevation indicator is at zero.

Lay the bore on the distant object for elevation by the elevating hand-wheel. The lines of sight through the dial sight and open sights should be on the distant object.

When using the target testing sights lay the bore on point B; the dial sight should be on point D and the open sights on point O.

If the dial sight is not in alignment, revolve the milled head at the top of the sight until the line of sight is correct, slacken the nut securing the micrometer collar, revolve the latter to zero, and re-clamp. If the open sights are not in alignment, slacken the clamping nut at the bottom of the

fore sight, screw the fore sight up or down until the line of sight is correct, and re-clamp.

NOTE.—After adjusting the micrometer collar of the cowl of the dial sight the arrow on the view finder may not be opposite zero; if confusion is likely to arise this arrow should be erased and a new one scribed opposite the zero mark.

Test 6.—Test for cross-levelling gear.

Set the elevation indicator at zero and lay the gun horizontal.

Fix the plane testing in the carrier No. 7 dial sight; place a field clinometer set at zero along the transverse positioning marks. Bring the bubble of the field clinometer central by the cross-levelling gear. The bubble of the cross level should now be central; if not, it needs adjustment. This should be done by a qualified artificer.

NOTE.—Until the “Plane, testing, carrier No. 7 dial sight” is in possession of batteries, the field clinometer will be placed on the top bearing surface of the carrier when testing cross-level.

CHAPTER V.—CARE OF EQUIPMENT.

1. CLEANING AND OILING.

Limber gunners should be intelligent and reliable men.

The projections on the exterior of the gun, which form guides for the latter when sliding in the cradle, should be kept clean and oiled and maintained in good working order; all working surfaces should be well lubricated and kept free from paint.

The bore should be kept clean and lightly greased. After firing, it should be scrubbed with caustic soda and hot water (one pound to a gallon), using the piasaba brush. When dry it should be lightly greased with mineral jelly.

No gritty substance, such as sand paper or bath brick, should be used for cleaning working surfaces.

All spare parts should be used periodically to ensure that they are in working order.

The axletrees should be greased frequently, the old grease, particularly from the channels of the pipe box, being removed before new grease is applied. If there is side-play between the wheel and the carriage, the linch pin should be withdrawn and the adjusting collar revolved to a suitable position to take up the play.

Heads of lubricators should be kept free from paint.

List of lubricators.

Fitting to be lubricated.	No.	Where situated.
Cradle	6	3 on each side for gun slides.
Recuperator slide	2	1 on front of each slide.
Capsquares	2	1 on each trunnion.
Traversing gear—		
Spur wheel	1	5 Case, spur wheel.
Pinion	1	
Bearing hand-wheel spindle	1	
General	2	
Elevating and traversing gear—		
Worm	1	8 Case, elevating and traversing gears.
Spindle worm	1	
Bearing hand-wheel	1	
Spindle arc pinion	1	
Bearing sight bracket	1	1 On top of bearing.
Link nut	1	
General	2	
Bracket supporting sight	1	
Elevating arc	1	On top of trunnion.
Brake gear	2	1 on each crosshead.
Cut-off gear	2	Inside cradle cap.
Saddle, pivot	1	Copper pipe in pivot.
Saddle clips	2	Right rear clip.
Bearing, breech mechanism lever	1	On top side of carrier.
Safety shutter	1	On top left side of carrier.
Carrier hinge joint	1	On top of hinge pin.
Breech screw and pintle of carrier.	1	On top side of breech screw.

2. THE ROCKING BAR SIGHT.

To avoid damage when travelling long distances, if the tactical situation permits, the sight bar and rocking bar sight complete are taken off by removing the front axis pin of the sight bar, and the split pins and collars of the rear axis pin of the sight bar and of the axis pin of the sight.

3. THE DIAL SIGHT AND CARRIER.

i. The No. 7 dial sight.

The dial sight when issued is in correct adjustment, water-tight, with all cells and joints secured by screws. It is very unlikely that the interior will be required to be cleaned, and the dial sight must on no account be taken to pieces except by persons in possession of a certificate from the Artillery College stating that they are qualified to do so.

The body of the dial sight must be cleaned with a clean soft cloth and a little oil, which must be rubbed off afterwards, care being taken that the glass is not touched. The exterior of the eye-lens and window should be cleaned with a soft cloth or chamois leather, which must be kept perfectly dry and clean, and be used for this purpose only.

Dermatine or rubber eye-guards should not be unnecessarily exposed to extremes of temperature, to the sun's rays, or to bright light.

Oil and grease will inevitably destroy rubber or dermatine, and prolonged contact with benzol, petrol and chemicals is undesirable. If, however, oil and grease gets on the eye-guard, it should be immediately removed either—

- (a) By wiping with a clean rag soaked in benzol or petrol.

(b) By washing in water to which a little soap and soda have been added.

(c) By wiping off with a clean dry rag.

When not in use the dial sight in its carrier should be kept in store box No. 5.

ii. The No. 5 carrier.

If the sight is loose in the bracket it may be due to:—

(a) The clamping screw head working out of its recess, making it impossible to clamp up. The remedy is to press the head into the recess and clamp.

(b) The bracket being worn or strained, owing to working the sight about when taking it out of the bracket or over-straining the clamping lever. In this case a clamp to compress the bracket should be fitted if available; if not, one side of the bracket should be tapped lightly and evenly with a hammer by an artificer, with the clamping screw loosened.

4. THE BREECH MECHANISM.

i. General precautions.

The breech mechanism should be dismantled periodically in order that it may be thoroughly cleaned.

The threads of the breech screw should be free from burrs. Should the screw not work easily when the obturator has been detached, the defect may often be remedied by careful filing by an artificer, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered up when possible to prevent dust and grit getting into the breech fittings. A cover is provided for this purpose.

The obturating pad should be examined to see that the canvas covering is intact and in working order. If the canvas cover is found to be loose or to overlap either of the protecting discs, the obturator should be changed.

The spare pad should be kept under compression in the box obturator.

The protecting discs and steel rings should be carefully examined, and they should be exchanged if either are eroded, burred or cracked.

When fitting the pad and discs on the axial vent, care must be taken that they are assembled in the correct order. The face of the pad marked "front" should be towards the muzzle. One or more steel adjusting discs may be required between the obturator and the face of the breech screw when the pad is compressed by firing, but the obturator should always turn freely.

The obturating pad should be a close fit in the coned seating of the chamber when the breech is closed. To ascertain this, lightly cover the seating with a mixture of oil and tallow; close and open the breech; the outer end of the pad should be covered with grease from contact with the greased seating of the chamber. If it is found that the pad does not fit the seating closely, adjusting discs should be added until the breech closes with some difficulty. The breech should then be opened and closed until it works easily. Before use, the pad and disc should be well covered with tallow.

Every opportunity should be taken to keep the obturator and axial vent cool. This can be done by pouring water over it in position, or by sousing it thoroughly with a sponge cloth during or after firing.

The obturator should never be dismantled when hot if this can possibly be avoided.

When a new pad is fitted, it must be expanded with a full charge.

ii. To dismantle the breech mechanism.

Before removing the mechanism, the breech must be opened, the lock and slide box removed, and the breech mechanism swung into the loading position.

Vent axial, safety shutter and obturator:—Remove the keep pin from the pin retaining axial vent, and safety shutter nut, and withdraw the latter clear of the recesses in the axial vent nut and safety shutter. Unscrew the axial vent nut and remove the nut and safety shutter to the rear. Remove the spring vent axial. Withdraw the axial vent and obturator from the front end of the breech screw.

Breech screw:—Insert a screwdriver in the slot of the eccentric pin actuating retaining plate, press in the pin and partially revolve it by means of the screwdriver until the indicating arrow on the pin corresponds with the middle of the word "dismantle" on the breech screw. Withdraw the breech screw from the front end of the carrier.

Roller breech screw:—Remove the keep pin and roller axis pin, and withdraw the roller.

Lever breech mechanism:—Remove the keep pin and nut from the crankshaft and withdraw the breech mechanism lever.

Lever breech mechanism bearing, crankshaft and cross-head:—Remove the keep pin and securing screw of the breech mechanism lever bearing and withdraw the securing screw. Withdraw the bearing and crankshaft from the carrier. At the same time remove the crosshead from the inner end of the crankshaft from inside the carrier.

Catch, lever, breech mechanism:—Drive out the securing pin of the spring retaining block, slide the catch downwards in the breech mechanism lever and withdraw the catch, then remove the spring and retaining block.

Are, control and cam rotating breech:—Remove the fixing screws and withdraw the control are or rotating cam respectively. (These fittings should not be taken off more often than is necessary.)

Carrier:—Remove the split pin from the hinge bolt and withdraw the hinge bolt from the top. Remove the carrier and bearing washer.

iii. To assemble the breech mechanism.

The breech mechanism is assembled in the reverse order.

iv. To dismantle the lock P.H. and slide box V.

To remove the lock and slide box:—Open the lock. Remove the screw securing slide box. Unscrew the lock and slide box from the stem of the axial vent or vent bush spindle.

To remove the lock from the slide box:—Remove the axis screw of the extractor. Press down the knob of the plunger retaining catch, then turn the actuating lever to the open position and remove the lock and extractor from the slide box.

To dismantle or change the striker:—Remove the lock from the slide box. Unscrew the actuating lever (left-handed thread). Remove the keep pin of the striker cap and withdraw the cap. Withdraw the striker from the actuating lever. Unscrew the nut striker. Withdraw the rebound collar, mainspring and mainspring collar from the striker spindle.

To dismantle the actuating lever:—Remove the keep pin. Remove the pin guide retaining catch. Withdraw the plunger and spring.

v. To assemble the lock P.H. and slide box V.

The lock and slide box are assembled in the reverse order.

5. RECUPERATOR AND BUFFER.

General precautions.

i. Before firing :—

Care should be taken to see that the recuperator and buffer are correctly charged, that there is no leakage at the stuffing boxes or rear end of the liquid cylinders, that the isolating valve is open, that the cylinder block is firmly nutted up to the lug of the gun and the piston rod and rams to the front cradle cap, that the cut-off gear is in adjustment and that no keep pins are missing.

It is necessary to strain the oil before charging the recuperator or buffer.

During severe weather, recuperators and buffers should be protected as much as possible from the cold.

Recuperator and buffer cylinders should be washed out with paraffin to remove grit as opportunities offer.

ii. In Action.

During action the functioning of the system should be carefully watched and steps taken at once to remedy defects.

The following are the more common faults :—

For any given fault the causes and remedies are set out in the sequence which should be followed to ascertain the particular cause and remedy, so that the simplest and most readily removed causes may be eliminated before proceeding to the more difficult.

Fault.	Cause.	Remedy.
Recoil violent ...	Air in buffer cylinder ...	Operate snifting valve.
	Insufficient liquid in buffer system.	Fill buffer and tank.
	Reduced air pressure in recuperator.	Test and recharge recuperator.
Recoil excessive ...	Wear of piston and valve	Adjust by cut-off gear.
	Buffer nearly empty ...	Fill buffer and tank.
Recoil short ...	Damaged slides ...	Examine and repair.
	Excessive air pressure ...	Test and expel surplus.
	Wrongly set cut-off gear	Test and adjust gear.
	Excess of liquid in recuperator.	Test and recharge recuperator.
	Packings too tight ...	Repack.
Run out slow ...	Valve adjusting run out incorrect.	Open valve.
	Burrs or grit on slides ...	Remove obstruction.
	Reduced air pressure ...	Test and adjust pressure.
	Packings too tight ...	Repack.

Fault.	Cause.	Remedy.
Run out violent ...	Valve adjusting run-out incorrect. Excessive air pressure ... Throttle valve fast in open position.	Close valve further. Test and expel surplus. If this is suspected and a few rounds fail to move it, then strip recuperator and replace valve.
Failure to run-out ...	Too much liquid in buffer Air in buffer ... Valve adjusting run-out closed. Burr or grit on slides ... Reduced air pressure in recuperator. Packings too tight ...	Operate snifting valve. Operate snifting valve. Open valve. Remove obstruction. Test and adjust pressure. Repack.

NOTE.—Reduced air pressure may be due to air alone, or may be caused by leakage of liquid from recuperator; the precise cause should be ascertained.

NOTE.—At high angles of elevation the valve adjusting run-out may require adjustment.

iii. When guns are resting in action :—

Cool the bore. Allow air to escape from the buffer by the snifting valve. Replenish the buffer if necessary. Tighten packings if necessary. Test the air pressure after the gun has cooled.

6. THE RECUPERATOR.

i. General precautions :—

Before the front cradle cap is removed the gun must be secured to the cradle so as to prevent it from slipping back. This is done by putting a bar through the holes for the cradle clamp and wedging a block of wood between the bar and the gun.

If the cradle cap is to be left off for a long time, the elevating handwheel should be taken off.

ii. To charge the recuperator with liquid :—

Secure the gun to the cradle and level the cradle longitudinally and transversely with a clinometer. Disconnect the cut-off gear, piston rod and rams. Remove the cradle cap. Discharge any air pressure in the air chambers by removing plug F and opening the valve G. Remove the plugs from holes D and E.

Remove the left-hand plug H; attach the pump connection and adapter and pump in about 32 pints of oil; disconnect the adapter and replace the left-hand plug H quickly to avoid losing oil.

Remove the right-hand plug H; attach the pump connection and adapter and pump in oil until it overflows at D and E; disconnect the adapter and replace the right-hand plug H quickly. Replace the plugs in holes D and E.

Care should be taken to see that the recuperator is correctly charged as too much oil will cause serious damage and put the gun out of action. When correctly charged it should contain 64 pints of oil.

iii. To charge the recuperator with air :—

Before charging the recuperator with air, it is important to see that the securing collars are in the correct position on the recuperator rams, in order to prevent the rams from being forced out to the rear when under pressure.

Attach the air pump to the brackets on the trail. Remove plug F and attach the adapter and pressure gauge; connect the pump pipe to the adapter. Slacken the locking nut, open the valve G and pump until the gauge registers 750 lbs. a sq. in. Close valve G, disconnect the pipe from the adapter and place the cap on the adapter. Let the pressure down slowly to 740 lbs. a sq. in. by opening valve G slightly and slacking back the cap on the adapter. When the pressure reads 740, close valve G, tighten the locking nut, remove the adapter with pressure gauge and replace plug F.

When charging by air bottle, care must be taken to open the cock gradually to avoid damage to the gauge.

iv. To test the air pressure:—

Remove plug F and attach the adapter and pressure gauge. Blank the outer end of the adapter with the cap. Slacken the locking nut, open valve G and the gauge should register 740 lbs. a sq. in.

If the pressure is correct, close valve G, tighten the locking nut, remove the adapter and gauge and replace plug F. If the pressure is not correct, close valve G, connect up the air pump and make up the pressure to 740 lbs.

Loss of pressure may be due to faulty rubbers ; if the fault is in the stuffing boxes oil will leak over the rams ; if on the heads of the rams, oil will leak from the perforated caps in rear.

v. To replenish air pressure lost by leakage:—

Proceed as for charging the recuperator with air, but, before opening valve G to admit air to the recuperator, pump the pressure in the pipe up to 740 lbs. a sq. in.

If the air pressure falls below 600 lbs. discharge the air pressure and check the amount of liquid in the recuperator by removing plugs D and E and levelling the cradle.

vi. To empty the recuperator:—

Secure the gun to the cradle, disconnect the cut-off gear, piston rod and rams, and remove the cradle cap. Discharge the air pressure by removing plug F and opening valve G. Remove the recuperator stuffing boxes and plugs H, and run off the oil. Lift the trail and rock the cradle up and down to ensure the complete emptying of the recuperator passage.

vii. To replace a ram packing:—

Secure the gun to the cradle, disconnect the cut-off gear, piston rod and rams, and remove the cradle cap. Discharge the air pressure and remove the securing collars of the rams. Attach to the gun a hauling rope to the rear and a check rope to the front. Empty the liquid from the recuperator, remove the attachment between the gun and the cradle and haul the gun and recuperator body to the rear until the rear closing caps are clear of the cradle. Remove the split

pin and cap, force the ram out from front to rear and remove it. Make fast the check rope, remove the packing, insert fresh packing and re-assemble the various parts. Re-charge the recuperator.

vii. To renew the hemp packing in a recuperator gland and the L leather or rubber in a recuperator stuffing-box :—

These operations are similar to those in section 7 (iv) and (v) below, except that the air must be discharged before removing the securing collar from the ram.

7. THE BUFFER.

i. To fill the buffer :—

Remove the filling hole plug in the top of the tank, and elevate the gun about 10 degrees. Press in the snifting valve and pour oil into the tank until it overflows at the snifting valve. Release the snifting valve, fill the tank and replace the filling hole plug. About 63 pints of oil are required to fill the buffer and tank.

ii. To empty the buffer :—

Lay the gun horizontal, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Remove the cradle cap and unscrew the stuffing box. Run the oil off into suitable vessels. Replace the cradle cap and re-assemble.

iii. To tighten the packing cap :—

Lay the gun horizontal, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Remove

the cradle cap and tighten the packing cap by means of the spanner provided. Replace the cradle cap and re-assemble.

iv. To renew the hemp packing in the buffer gland :—

Elevate the gun to a convenient position, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Remove the cradle cap, unscrew the packing cap, remove the spring, sleeve and defective packing, and renew. Replace the sleeve, spring and packing cap, replace the cradle cap and re-assemble.

v. To renew the L leather or rubber in the stuffing box :—

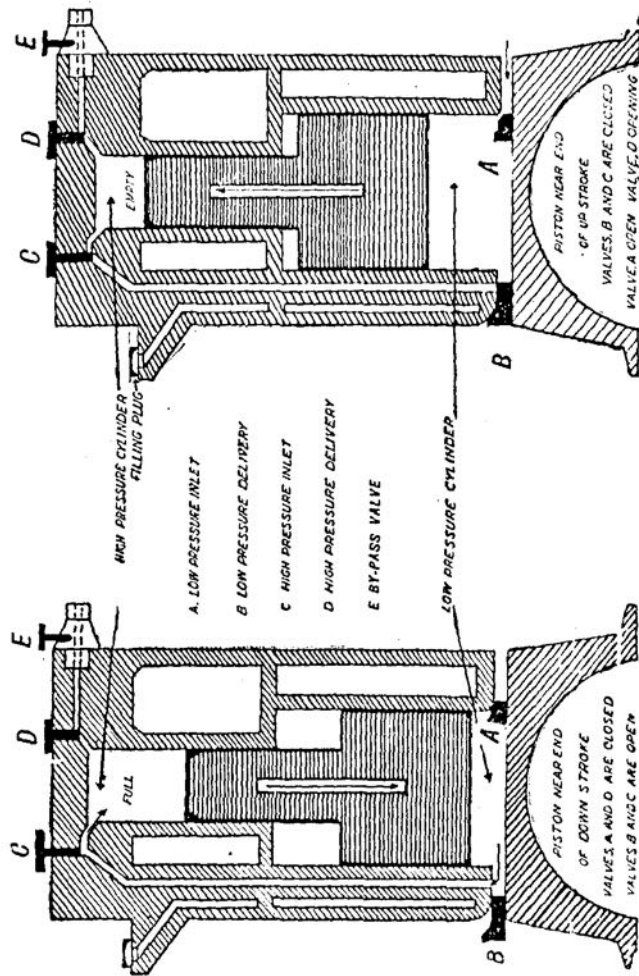
Elevate the gun to a convenient position, secure it to the cradle and disconnect the cut-off gear, piston rod and rams. Remove the cradle cap. Remove the packing cap and spring and unscrew the stuffing box together with the defective packing. Renew the packing. Replace the stuffing box, spring and packing cap. Refill the buffer, replace the cradle cap and re-assemble.

8. THE AIR PUMP.

A dust cover and two lifting bars are provided with the pump. The cover must be kept on when the pump is not in use.

The water jacket must be kept filled when the pump is in action. In cold weather empty the jacket immediately after action and close valve A to prevent dirt and grit entering the cylinder when standing. Open again when putting the pump into action and set the sight feed lubricator to give eight drips per minute.

Before charging the recuperator it is advisable to test the pump system as follows : Close the air charging valve of the



recuperator. Work the pump slowly until the gauge registers 740 lbs. a sq. in. If the system is in good working order, the gauge hand should remain stationary, or only creep back very slowly. Should the hand fall back quickly the system should be examined for external faults. Faults may be located by smearing wheel grease over the joints; air bubbles will be observed where there is a leak.

Great care should be exercised in using the gauge. When taking or releasing pressure the valve should be opened gently in order to prevent damage to the gauge.

If the pump only gives 20 lbs. pressure, valves B and C are faulty. If the pump only gives 200 lbs. pressure valve D is faulty. If no air is delivered valve A is faulty. If the valves are proved to be in order, look to the packing rings of the piston. In the event of valve D going out of order, and no spares being available, replace it with valve B; valve C should not be used for this purpose.

If necessary, the valves should be lightly ground in and coated with thin oil.

9. DISMOUNTING AND MOVING THE GUN.

i. To dismount the gun by rollers :—

Stores required.

Picks ...	1	Skids, 6-in. by 9-in. ...	4
Shovels ...	1	„ 4-in. by 5-in. ...	8
Handspikes, lifting ...	2	„ 3-in. by 6-in. ...	4
Handspikes ...	4	Rollers, 3 ft. by 6-in. ...	2
Planks, 10 ft. ...	2	Luff tackles ...	4
„ 6 ft. ...	2	Dragropes, heavy, pairs	1
Levers, 14 ft. ...	1	Lashings, 1½ in. ...	10
Scotches ...	4		

Men required, 11.

Lay the gun approximately horizontal longitudinally, put on the brakes and remove the breech mechanism and rocking-bar sight. Place the small end of a handspike, lifting, in the breech, leaving about 12 inches projecting; make fast the double blocks of two luff tackles with $1\frac{1}{2}$ -in. lashing to the handspike, lifting, as check ropes, lay the single blocks on top of the wheels for the moment and take a turn with the running ends round the axletree arms.

Disconnect and remove the front cradle cap. Replace the recuperator ram nuts and make fast a piece of $1\frac{1}{2}$ -in. lashing to each ram.

Place the small end of a handspike, lifting, in the muzzle leaving about 12 inches projecting; make fast the double blocks of two luff tackles with $1\frac{1}{2}$ -in. lashing to the handspikes, lifting, lashing the hooks close up to the lever. These tackles are to be used as hauling tackles.

Place the single blocks on top of the wheels and lash them with $1\frac{1}{2}$ -in. lashing, passing the lashing round the fellocs and through the hooks of both hauling and check tackles.

Pass the running ends outside the wheels towards the rear.

Put one man on the running end of each check tackle in front of the axle tree.

Place the ends of two 3-in. flats under the sides of the cradle on top of the lugs of the cradle clamp, arranging the flats so that their inner ends are flush with the inside of the lugs. Elevate the gun until the cradle rests on top of the flats.

Place two 10-ft. planks on top of the trail side by side in prolongation of the gun, one end resting on the top of a 6-ft. plank placed across the trail immediately in rear of the cradle clamp, the other end supported on a pile of skiddings sufficiently high to ensure that the underside of the planks clear the tops

of the brackets for the handspikes, lifting (about 1 ft. high will usually be enough). Place two 3-in. flats upon the trail under the centre of the 10-ft. planks to act as a support for the latter. Place eight 4-in. by 5-in. skids, overlapping, on their edges on top of the 10-ft. planks.

Put the remainder of the men on the running ends of the hauling tackles. Ease off on the check tackles and take in on the hauling tackles until the nut securing the gun to the recoil arrangements is just clear of the cradle. Disconnect the copper pipe from the buffer. Disconnect the nut, place the small end of a 14-ft. lever against the projection for securing the gun to the recoil system, and by pushing with the lever and hauling on the pieces of lashing attached to the recuperator rams move the recoil system up to the front until the front guides are just clear of the recuperator slides.

Continue hauling the gun to the rear until a 3-ft. by 6-in. roller can be placed on top of the 4-in. by 5-in. skids in front of the lug on the breech of the gun. Apply a 14-ft. lever as a lever of the first order under the breech ring, in prolongation of the axis of the piece, using a 3-ft. by 6-in. roller as a fulcrum. Take the weight on the lever, depress the gun slightly and clear away the 3-in. flats from under the cradle, place in a 3-ft. by 6-in. roller on top of the 4-in. by 5-in. skids and elevate until the gun rests on top of this roller.

Clear away the lever and fulcrum. Ease off on the check tackles until the breech roller is near the front end of the breech guide.

Great care must be taken at all times to see that no weight is taken on the dust excluders joining the breech and muzzle guides.

Apply the lever as described above and run the breech

roller down to the breech end of the breech guide. Continue easing off on the check tackles until the front of the muzzle guide is within one inch of the rear end of the cradle.

Place a 3-ft. by 6-in. roller under the breech end of the muzzle guide, elevating or depressing the cradle as required by the elevating handwheel. After the first roller has been placed in position, No. 1 should take post at the elevating and traversing handwheels, and while the gun is still within the cradle guides, he should see-saw the handwheels to prevent the guides seizing in the event of the roller not moving at right angles to a line parallel with the centre line of the cradle.

Continue easing off down the 4-in. by 5-in. skids. Adjust the rollers as required, the breech roller with the lever as already detailed, and the muzzle roller by applying handspikes as levers of the second order under the muzzle with the 10-ft. planks as a fulcrum.

When the breech is near the ground, make arrangements for removing the gun.

ii. To remove the gun with a lorry :—

If the local situation permits the lorry to be backed up to the trail of the gun, a similar arrangement to the above can be employed, with the exception that the trail should be raised and supported upon short skidding and the 10-ft. plank led direct into the lorry.

NOTE.—The weight of the gun without breech mechanism is 3 tons 3 cwt. 3 qrs.

iii. To mount the gun.

The procedure is the reverse of that described in section 9 (i).

APPENDIX.

CARRIAGE OF STORES.

1. Stores carried on the carriage.

Article.	No.	Where carried.
Brush, rammer and sponge	1	On top of trail, left side.
Can, lubricating, No. 9	1	On left side of trail.
Cleaner, piaseba	1	On left side of trail.
Handspikes, lifting	4	On top of trail, centre.
Rimers, vent, axial	2	In pocket on right side of trail.
Stave, end, No. 15	1	On top of trail, right side.
Stave intermediate	1	On top of trail, right side.
Tray, loading	1	On top of trail.

2. Stores carried on the limber.

Article.	No.	Where carried.
Axe, felling	1	On rear of limber.
Axe, pick	1	Under limber.
Box, grease	1	Under limber, off side, rear.
Brush, water, carriage	1	Under limber, near side, front.
Can, lubricating, No. 3	1	Under limber, near side, rear.
Hook, bill	1	Under limber, off side, front.
Posts, aiming	2	On rear of limber, in straps for felling axe.
Rifles, in covers, in clips	2	On front of limber.
Ropes, drag, heavy, pairs	1	On splinter bar.
Shovels	2	On sides of limber.

3. Stores carried in limber box.

Articles.	No.	Remarks
Adapter, pressure gauge with cap	1	
Box, obturator	1	
Gauge, pressure, No. 5	1	
Measure, filling, hydraulic buffer	1	
Pins, keep, split (in tin box) sets	1	
Spanners—		
No. 1	1	
" 2	1	
" 3	1	
" 4	1	
" 7	1	
" 8	1	
" 9	1	
" 12	1	
" 13	1	
" 14	1	
" 15	1	
" 16	1	
" 17	1	Not for Mark VII.
" 21	1	
" 22	1	
" 24	1	
Spanner, travelling carriages, No. 23	1	
Tommy, No. 38	1	
Carried in tray No. 1.		
Buffer, hydraulic—		
Rings, compressed, packing	2	
Rings, packing, L Section, stuffing box	2	
Springs, gland... ..	1	

3. Stores carried in limber box.—*continued.*

Articles.	No.	Remarks.
<i>Buffer hydraulic—continued.</i>		
Washers, packing, stuffing box and control cylinder ...	2	
Washers, air and filling plug (2 to set) ...	4	
Washers, plug, adjusting, run-out ...	4	
<i>Gear, elevating and loading—</i>		
Spring, plunger, left ...	1	
Spring, plunger, right ...	1	
<i>Recuperator—</i>		
Rings, compressed packing ...	2	
Rings, packing, L Section, stuffing box ...	8	
Rings, packing, U section ...	12	
Spring, gland ...	1	
Spring, spiral ...	1	
Spring valve, throttle ...	2	
Washers, packing, stuffing box ...	4	
Washers, air and overflow plugs ...	4	
Washers, plug adapter, pressure gauge ...	6	
Washers, plug adapter, hole and plug, overflow (4 to set) ...	1	
Washers, connection, adapter oil filling ...	4	
Washers, plug adapter, pressure gauge ...	2	
Washers, cap, adapter, pressure gauge ...	2	
Washers, connection, pressure gauge ...	2	
Carried in tray No. 2.		
Bits, vent ...	2	
Funnel, filling cylinder, No. 3 ...	1	
Screwdriver, adjusting sights, No. 1 ...	1	
<i>Spanners—</i>		
No. 5 ...	1	
„ 6 ...	1	
„ 10 ...	1	
„ 11 ...	1	

3. Stores carried in limber box—*continued.*

Articles.	No.	Remarks.
Spanners, adjusting sights—		
No. 1	1	
" 3	1	
" 4	1	
Tommy, carriage travelling, B.L. 6-inch gun		
and 8-inch howitzer	1	
Wrench, breech mechanism—		
No. 137	1	
No. 138	1	

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Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by Harrison & Sons, Ltd., 44-47, St. Martin's Lane, W.C.2.

(B 27-14) Wt 19643—1996/1025 2000 1/23 H & S Ltd, G27 OD 48